Using Social Media to enhance knowledge sharing in authentic contexts: a case of undergraduate Computer Science students at Bindura University

By

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COMPULSORY DECLARATION

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works, of other people has been attributed, and has been cited and referenced.

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SUPERVISOR'S APPROVAL OF SUBMISSION OF DISSERTATION FOR EXAMINATION

I confirm that I have seen ✓/~~have not seen~~ the final version of Tarirayi Mukabeta (MKBTAR001) _____(candidate's name) dissertation and that it is submitted for examination with✓/~~without~~ my approval.

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Abstract

Social Media(SM) is one of the major ways that the 21st Century students communicate and interact with one another. This has been evidenced by wide academic research on SM usage in modern education settings. Facebook is one of the most popular SM sites visited by students on a daily basis. In this minor-dissertation, a study of Bindura University Computer Science students' educational uses of Facebook during Industrial Attachment is explored.

Qualitative results of students' interaction on Facebook (FB) to explore authentic learning during industrial attachment are discussed. In this study, conversation analysis of Facebook posts was performed against nine elements of authentic learning by Herrington Reeves and Oliver (2010). This was done to investigate the extent to which FB supported authentic learning during Industrial Attachment programme. Students were exposed to an environment where ideas could be explored at length in the context of real situations. Experiences shared and analysed showed that tasks assigned were complex and broad enough for students to actually make decisions about how they are supposed to complete them. This qualified authentic learning during industrial attachment.

Results of this study show that social media use in education enhances knowledge sharing. Experiences and discussions analysed highly evidence the pedagogy of authentic learning during industrial attachment in the computer science programme. From this, adoption of authentic learning as a pedagogical model is suggested in response to the need to help equip students for the industry. It is also suggested that the pedagogy of authentic learning in industrial attachment programmes should be effectively appreciated in computer science. A model of Facebook as an educational resource to understand authentic learning experiences during industrial attachment is presented.

Keywords: Industrial Attachment, Social Media, Facebook Groups, Authentic Learning, Computer Science, Online-Interaction.

Dedication

It is with deepest gratitude that I dedicate this thesis to my supervisor Professor Dick Ng'ambi who has been a constant source of knowledge and inspiration, along with my loving husband Kelvin Mukabeta whose words of encouragement and push for diligence ring in my ears. I also dedicate this thesis to my two children Tavimbanaye-Kailynn and Tinaye-Blessing, I would not have finished this dissertation without any and all of you.

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List of Acronyms

BUSE	Bindura University of Science Education
IA	Industrial Attachment
CS	Computer Science
AL	Authentic Learning
CA	Conversation Analysis
CILT	Centre of Innovation in Learning and Teaching
UCT	University of Cape Town

Glossary

Term	Definition
Industrial Attachment	an umbrella term referring to an educational strategy applying work-based learning that is related to the student's academic curriculum and learning goals (Bansal et al., 2010).
Authentic Learning	The notion of learning knowledge and skills in contexts that reflect the knowledge will be useful in real life (Herrington, 2009)
Conversation Analysis	a process involved in the study of orders talk-in-interaction, where people are talking with each other just for the purpose of talking, as a form of sociability or to indicate an activity of interactive talk independent of its purpose (Have, 2007)

Chapter 1: Introduction

1.1. Background to the research

1.1.1. Challenge of producing quality graduates for the industry

Although Computer Science is one of the youngest and most exciting of scientific disciplines, research in teaching Computer Science in authentic contexts remains underexplored (Jacko, 2012; Schneider and Gersting, 2012). While computer science drives fundamental technologies in today's ever-changing connected world, much still needs to be done to support skills relevant to this industry in the current millennium (Bansal, Grover and Kumar, 2010; Hill and Smith, 1998). Bozalek et al. (2013) agrees and further explains that transmission of disciplinary knowledge alone cannot prepare students fully for industry (Bozalek, Gachago, Alexander, Watters, et al., 2013). Furthermore, higher education terrain is significantly challenged and transformed by information revolution and the dynamic changes in technology innovations. This may lead to a need for revolutionising access and intervention of higher education experience. Having a solution to these will enable education institutions to produce the required workforce that effectively meets the ever-growing demand for highly skilled personnel (Ashford-Rowe, Herrington and Brown, 2014). The growing nature of the computer science field, coupled with the dynamic nature of industry, and ICTs as a driving force compels that need for the computer science programme to adequately equip and psyche students for real-world working environment. In this study Facebook is employed as a mediating educational resource to understand authentic learning experiences shared during industrial attachment in the Computer Science programme at Bindura University.

1.1.2. Low uptake of Computer Science Programmes

Reports of significant advances in computing come up frequently through a diverse range of media including newspapers, television and electronic media. This

prompts the need to motivate more school students to pursue computer science careers (Schneider and Gersting, 2012, Black et al., 2013). While research has also shown computing industry as both prospering and evolving, students' uptake of computer science programmes remains low (Brown et al. 2013). Quality graduates in the field of computer science and related disciplines are still scarce to support the significant increase in computing industry (Black, et al., 2013; Brown et al., 2013). In response to this, computer science related degree programmes have been introduced by a number of universities worldwide to cater for this shortage. A variety of subject disciplines exist including Hardware, Software and Networking majors. A simple online search of this/related programme yields a very high number of responses in many education institutions worldwide, with a variety of naming specific to institutions offering it. This is enough evidence to show that these institutions are making every effort to fill the skills gap existing in the computer science industry. Specifically, students in computer science related disciplines need to acquire high quality skills that allow them to adapt to the obvious dynamic terrain of computer science.

1.1.3. Zimbabwe Policy address the workforce shortage

Although Zimbabwe's workforce is still regarded among the best in terms of level of education, there still exist significant gaps in personnel with a strong background in Science, Technology, Engineering and Mathematics (STEM) disciplines (Afonja, Skaru-Lartey and Oni, 2005). One of the measures to address this challenge that modern technologies should be mastered and integrated into socio-economic activities including education (Second Science, Technology and Innovation Policy of Zimbabwe, 2012).

1.2. Research problem

1.2.1. Bindura University Computer Science Programme

Like many other universities, in Zimbabwe, Bindura University is among the science universities offering a computer science undergraduate programme. This programme is aimed at equipping graduates with a strong foundation of study in the computer science field. Majors include computer software engineering, computer

hardware and computer networking. The computer science degree programme is offered as a conventional programme with first, second and fourth year courses hosted at the Bindura University Main and Astra Campus in Bindura approximately 87km northeast of Zimbabwe's capital city Harare. The third year of study (industrial attachment) involves a student having to work in a relevant department of an organization of their choice anywhere in Zimbabwe.

Individual computer science courses themselves represent distinct areas but most of them feed into each other and make connections that interlock them in such a way that each specific course “needs/relates” to one or more courses for it to make sense. A course like CS115 (Systems Analysis and Design) helps students link with the programming concepts they are taught and equips them with all that they need to deploy working software systems. This dispels the common myth among most students that computer programming is all they need to develop and deploy a system. As some of the course content overlap, students need to be motivated to do a lot of practice in order to develop required skills (Law, Lee and Yu, 2010).

1.2.2. The need for authentic learning in Computer Science Programme

While universities are making considerable effort in increasing numbers of graduates in this discipline, university teaching alone without an authentic experience of the real world application is not enough to prepare students for the industry. Herrington (2009) defines authentic learning as the notion of learning knowledge and skills in contexts that reflect the knowledge will be useful in real life. While the pedagogical goals for industrial attachment are to ensure that students have an experience working on and learning from real-world environments, lack of support demotivates students (Simpson, 2013). This has a negative impact to the objectives of industrial attachment. Anecdotal evidence shows that as students are geographically dispersed during industrial attachment, student-established online informal groups using a variety of emerging technologies keeps them together in a community. This shows a need for institutions to embrace ways of improving pedagogy in ways that are more familiar to the students.

Although Industrial attachment is not a new introduction to undergraduate degree programmes, its integration in the computer science degree is perceived to provide some way of allowing students to have an authentic experience which complements theory learnt within the first two years of the study (Bansal et al., 2010). While industrial attachment provides students an opportunity to relate classroom theory learnt the real world, authentic learning pedagogy during industrial attachment programmes is not effectively appreciated in computer science (Tan and Phillips, 2005; Herrington and Reeves, 2010). In response to the need to help better prepare students for the industry, there is a need to adopt the authentic learning framework not just as a theory but rather as a pedagogical model (Herrington and Oliver, 2010).

Authentic learning has been applied in several disciplines including History (Herrington, 2010), Geography (Koseoglu et al., 2012), Hospitality and Tourism (Deal et al., 2010), Vocabulary Learning (Wong and Looi, 2010). Its use in the computer science field has not been adequately explored. Consequently, authentic learning may bring the required challenges that students need to experience in order to learn to produce and apply knowledge in solving real problems. This is seen to be a life skill necessary in the field of science and computer science is not left out. Thus, linking authentic learning to industrial attachment where students are in a real world context becomes inevitable for the computer science degree programme (Bozalek, Gachago, Alexander, Watters, et al., 2013). In order to contextualize curriculum to what students are experiencing in real world scenarios, nine elements of authentic learning that can be incorporated to make learning meaningful (Herrington and Parker, 2013). These elements are: 1) An authentic environment; 2) Authentic tasks; 3) Expert performance; 4) Multiple perspectives; 5) Collaboration; 6) Reflection; 7) Articulation; 8) Coaching and scaffolding; and, 9) Authentic assessment. In this study, Facebook was used as a mediating tool to understand the existence of the nine authentic elements against during industrial attachment.

1.2.3. Industrial Attachment Faculty Objectives

Industrial attachment objectives stated in the faculty policy are availed to and used by both students and host organisations to inform practice. These include the following:

- "*To offer students an opportunity to test their theoretical tools and constructs learnt during their first two years of the degree programme with the realities of running business organizations in Zimbabwe and worldwide.*

- *To expose students to behaviours of organizations that are both internal and external environments.*

- *To offer students an opportunity to develop hands-on experience in the world of business and its intricacies.*" (BUSE FoS, nd)

While the above stated objectives are availed to relevant stakeholders, there are limited ways of understanding how these are achieved. There is therefore need of assessing whether the set targets of industrial attachment are achieved and or to come up with a way of assessing how they are achieved.

1.2.4. Challenges Faced by Students during Industrial Attachment

The industrial attachment curriculum for the computer science degree programme at Bindura University as reflected in the objectives aims at enhancing the programme. While these are clearly defined objectives, it is not obvious that in reality students get access to working on live systems. In some cases, once a student is thoroughly trained in working on different systems they may be assigned tasks that they can work on their own with minimum supervision. In other cases, students only watch the supervisor working on the live systems. There are, however, extreme cases where students are not even allowed to get access to or get training on how the systems are used. This ultimately means students may not often get a chance to learn and work on live systems.

1.2.5. Social Media and Networking

Information and communication technologies including laptops, smart-phones, the world-wide-web, cloud computing and mobile applications are increasingly becoming part of our lives (Sullins, 2014; Mukabeta et al. 2013). Sullins, (2014) further argues that Facebook is one of the famous social networking sites that facilitating sharing of information with a virtual community of end-users usually known as "friends". This new trend provides an opportunity to explore this phenomenon of industrial attachment. Chiluwa (2012) affirms that *"social movements need the kind of communication networks which social media provide, and that social media networks (SMN) do indeed contribute to the process of forming social movements as well as effective social action"* (p.219). This position is seconded by Broersma and Graham (2012) whose research showed Twitter as a technology that enhanced political journalism during the Dutch and British 2010 voting period. Social media provides a platform for networking were people can be able to create and use virtual identities in order to connect, interact and share information. However, use of social media in the educational contexts still reflects a virgin area for research. The next section outlines the research questions that this study aims to answer.

1.3. Research Questions

In order to explore authentic learning in computer science industrial attachment in this study, the researcher investigates and seeks out answers to the following:

1. How does authentic learning happen during industrial attachment?

2. In what ways can knowledge sharing and or authentic learning be fostered using social media among geographically distributed learners?

3. What are the students' perceptions of using social media to enhance their authentic learning experience during the industrial attachment programme?

1.4. Research Objectives

This study seeks to investigate the extent to which the nine principles of authentic learning suggested by (Herrington et al., 2010) exist in the industrial attachment break for computer science students. Social media can be a basis of connection for students who are geographically dispersed, where knowledge is created and shared though conversations captured on this platform. Conversation analysis is the method adopted in qualitative analysis of online interactions of students and supervisor to inform the researcher on the existence of authentic learning in the computer science industrial attachment programme (Flick, 2014). Through this study, the researcher aims:

- To provide pedagogical insight on how to effectively support authentic learning using social media during industrial attachment.

- This study will also contribute useful suggestions for educators in developing contexts that incorporates online learning in meaningful and engaging ways.

1.5. Description of the methodological choice

The authentic learning pedagogical framework by Herrington et al. (2010), will underpin this study. Principles of authentic learning are mirrored on the experiences shared by computer science students during industrial attachment break. A qualitative analysis of Facebook posts from students is performed to investigate the extent to which authentic learning exists during industrial attachment break. Conversation analysis is the analytical framework applied to these Facebook interactions. Knowledge created and shared through discussions is mirrored against the nine authentic learning elements.

1.6. Structure of the study

Underpinned in the Authentic Learning framework, this study is outlined in five detailed chapters.

The Introductory chapter, presents the background to the study problem and the main thrust of the study. Then follows a description of purpose of the study, an outline of research questions and objectives and a description of the methodological choice. This chapter highlights the significance of industrial attachment for the computer science degree programme and its relationship to authentic learning theory.

Chapter two details relevant review of literature upon which this study is rooted. Initially, an overview of the chapter is described with the aid of a conceptual framework diagram where the different theories and concepts underpinning this study are discussed. Thematic concepts reviewed in relation to their relevance to the computer science programmes include the main framework, social media as a mediating tool, authentic learning, online interaction between educators and learners, conversation analysis as an analytical framework for online interaction and industrial attachment.

The methodology of this study is expanded on in the third chapter. This chapter is initialized by a description of the research context, followed by a narration of the ontological and epistemological assumptions that underpin the study. An identification and justification of the type of research follows along with description and justification of the research approach. Selection of participants, data collection method, data analysis method, validity and ethical issues, step-by-step activities undertaken and analytical framework are then discussed. A brief summary concludes the chapter.

Chapter four, details the findings and analysis of the study. Conversation analysis is employed to evaluate from students' postings the extent to which authentic learning exists during industrial attachment break. Themes identified from the data collected throughout the lifetime of this study are also discussed.

Chapter five provides a summary of findings of the research project. Limitations of the study are briefly discussed. This section is followed by a conclusion of the study drawn from the findings and literature review. This sets an opening for new ground for wider research, which is presented as the recommendations in the final section of this study.

Chapter 2: Literature Review

2.1. Introduction

This chapter provides an overview of previous research that this study hinges on. Relevant literature, reviews and reports were studied to shed more light on the application of authentic learning during industrial attachment break of the computer science degree.

It is important to note that relevant literature on research into enhancing authentic learning through online support of students is diverse. It covers themes that focus on effective pedagogical uses and modelling of authentic learning, modeling online environments to provide authentic learning which in turn, paves the way for the need to develop strategies for effective communication and management of online interactions. A review of literature in this study focuses on authentic learning history and practices in education, followed by specific cases of its application. Major gaps observed throughout this part of the review will leverage a way for the researcher to understand and come up with new knowledge.

A review of literature describing challenges specific to the teaching of computer science follows, this sets the tone for unpacking the relevance of research into authentic learning in this study area becomes relevant. A review of the findings of recent research on the practical component of the computer science programme is relevant as its description clarifies how the purpose of this study is to be achieved.

Related to authentic learning, the researcher reviewed literature on the industrial attachment break which adds value to learning. While on industrial attachment, learners apply theory learnt during a traditional semester in solving real world problems. As highlighted in the previous chapter, qualitative data extracted and analyzed from online interactions by participants (students) with university supervisor (researcher) informs the researcher of major activities and experiences of students during industrial attachment.

This qualifies the need for reviewing literature into social networks and their use in education follows.

Online interactions of students with peers and students with the instructor forms the last part of the literature review as the researcher identifies and describes gaps in literature and how this study seeks to fill them.

To end the chapter, I present the conceptual framework of the outline of the overall research and ideas used to structure this study based on the literature described.

2.2. Computer Science Degree Programme

A decline in the Computer Science degree programme uptake has been observed in many countries despite the increased need for computer science skills caused by IT growth in industry and society (Brown et al., 2013). As students share experiences and help each other find solutions to real-world problems in the field, real issues that need to be addressed in order to improve uptake of these programmes are unveiled. Brown et al. (2013) notes that although computing industry is prospering and evolving in fields such as the Smartphone `app' market, the video game industry which itself uses increasing amounts of technology not to mention growth of companies such as Google and Facebook, a shortage of quality computer science graduates to support this growth has been reported in United Kingdom industry. This can be explained by the decline in the number of students enrolling for Computer Science degree programmes as well as Computer Science at A-level. This study aims to apply and analyse established ways of motivating students who have taken up a computer science degree programme. If students are motivated, the numbers of dropouts in science programmes are destined to reduce.

In this study, 'industrial attachment' is a phrase used to illustrate arrangement that takes place between education institutions and organisations in the “real world” designed to provide and/or enhance the professional education experience of students with an extended period of practical work placement (Ruhanen, Robinson and Breakey, 2013; Pillai, Khan, Ibrahim and Raphael, 2011). A number of terms have been used

interchangeably to mean the above including “experiential learning”, “situated learning”, “apprenticeship” and “internship” (Collins, 1999; Ruhanen et al., 2013; Kim and Park, 2013; Pillai et al., 2011). Zopiatis and Constanti (2007) argue that internships are not easily defined due to their varied scopes and are mostly determined by the unique nature of a school’s curriculum and resources as well as a corporation’s operational policy.

Although industrial attachment has been hailed for a number of benefits that it brings to students, organisations and education institutions, successful learning and supportive administration at the college level have been seen to be critical components of students’ confidence regarding their future careers (Pillai et al., 2011). A list of expectations sent to an organisation that has accepted a student for industrial attachment is not enough to assure that students will get a desired experience. It is therefore important for academics and programme managers to understand student perspectives of internships. This is because these opportunities are now recognized as an ‘essential collegiate experience, opposed to just an optional enhancement to academic requirements (Collins, 2002 cited by Ruhanen et al., 2013).

2.3. Authentic Learning

2.3.1. Overview of Authentic Learning

Authentic learning is coined by the work of Herrington, Reeves and Oliver (2010). Herington et.al (2010) provide the principles of a more authentic approach as tied to teaching and learning, where knowledge from authentic learning is suggested to be a result of access to problem solving situations. Education in the 21st century is required to provide authentic educational experiences for the youth in order to reduce the gap between school life and workplace life that remained evident (Smith and Hill, 1998). Herrington et al. (2010) argue that historically, emphasis on learning has been on extracting essential principles, concepts and facts and teaching them in an abstract, decontextualized form which owes to the failure of learners to apply what they have learnt to solving real world problems that the industry is faced with. By citing examples of scenarios where pilots, military commanders’ physicians and others involved in life-or-

death decisions may fail to access critical knowledge that was learned outside the context of application, Herrington et al. (2010) observe that failure to access and use critical knowledge has much more serious consequences in contexts where split second decisions must be made. This is in agreement to the context of education in computer science as experts in this discipline actually work in real life scenarios that need nothing short of accurate decisions to be made. Computer science students need to learn and apply skills in real situations.

Much of the de-contextualised knowledge taught in schools and universities is suggested as not retrievable in real life, problem solving contexts because this approach often disregards the interdependence of situation and cognition, resulting in learners' perception of knowledge as the final product of education rather than as a tool to be used dynamically to solve problems (Herrington et al, 2010; Herrington and Oliver, 2000). Practitioners in further and higher education are offered a means to question and review the reliance of the sector on pedagogy that promotes decontextualized, abstract forms of learning that frequently remains inert through these studies. There seems to be consensus that pedagogical significance is critical in the way people learn and apply their understanding in real life problem - solving situations. This, in turn, can be applied to higher education pedagogical techniques and practices to foster meaningful learning.

2.3.2. Authentic learning by definition

Authentic learning is defined as involving alignment of student learning experiences with the world for which they are being prepared (HERDSA, 2002). Herrington's definition of authentic learning concurs with Collins' definition of situated learning as the notion of learning knowledge and skills in contexts that reflect the knowledge will be useful in real life (Collins 1988, cited by Herrington, 2009). Collins (1998) articulates that situated learning is an indispensable and essential of on job training. The author cites advantages of situated learning as including, students learning conditions for applying knowledge, situations helping to foster invention, students seeing the implications of knowledge and context helping to structure knowledge appropriate to its uses (Collins, 1998). Authentic learning is viewed as a discipline having six strings namely contextual, connected, collaborative, change- directed, conversational, and

continuous environment (Wilcroff, nd). This is unpacked in the context of industrial attachment as follows:

1. Contextual - where participants of this study are computer science students on industrial attachment working in a physical environment reflecting the way knowledge will be used in real life.

2. Connected - where students interact and share knowledge connected using a Facebook group.

3. Collaborative - where students either work in teams at the organisation attached or collaborate online by sharing knowledge that is in turn applied in solving real problems they are solving in industry.

4. Change- directed, where students' knowledge is created and directed to solving real problems as well as create new knowledge aimed at changing practice in more effective ways.

5. Conversational -knowledge sharing is in form of interactions happening on the Facebook group, and

6. Continuous - where students are attached for a continuous period in which they can be exposed to complex problems needing real solutions that can be learnt and worked over time.

An authentic environment enables deeper achievement aside of just attaining a good grade and or pleasing a teacher. Learning processes with real purposes and a real audience by creating real products is based on an idea that learning can and should last longer than a course.

2.3.3. Application Areas of Authentic Learning

Authentic learning has been applied in various disciplines, including marketing, research and medical field. In this section five studies are reviewed. The following

section aims at understanding how authentic learning was applied in research. This is intended to inform the researcher the best ways in which authentic learning can be applied in the current study.

The first study reviewed is where Ma and Lee (2012) applied authentic learning strategy to two upper-level classes in apparel merchandising at two universities located a significant distance from one another. Students were provided with a scenario that has real world relevance in order to assess students' learning experiences from the project. One group played the role of clients while the other group served as consultants. Quantitative and qualitative data were gathered from 44 undergraduates enrolled in apparel and merchandising classes to assess students' learning experiences from the project. According to their findings, students had a positive learning experience overall, gaining practical competencies and experiences from various perspectives needed to solve the problems. Students positively rated the project. Students' agreement to the items ranged from 79.5% to 95.5% showing that the majority of students in this study believed in the real-world-based project to be helpful and valuable for their learning and preparations for their future. These results were further confirmed by five emerging themes in the qualitative data. First, students improved communication skills, by working with their team members and their clients/consultants at a distance. Students learned the importance of communication in a business setting and how to communicate effectively in a professional manner. Second, students enhanced professionalism through real world experiences by obtaining insights into professional careers from the project's real-life aspect. Students felt professionally prepared for the job and seemed to like their roles as if they were actually working in the industry than just being mere students. Third, students learned how to enhance teamwork skills and to develop effective strategies for collaborative work when they worked in teams. This has been supported by Lombardi (2007), who pointed that teamwork is vital in authentic learning experiences because it is commonly practiced in a real business workplace setting and professionals work together to negotiate their various perspectives. Fourth, students expressed how they were learning through interaction. Students enjoyed gathering input and suggestions for their project from students at the other institution and felt as if they were actually working for their partners. Cranton and Carusetta (2004) agreed to this by demonstrating that interaction among all students and teachers empowers a student's

ability to learn and process information. Lastly, students learned to improve their research skills through learning how to investigate a problem and to compile the necessary information to make an informed decision. In the authentic learning strategy, it is important that students be responsible for researching more information for their own project so that they develop and exercise their research skills to gather relevant information needed to complete their task or solve problems (Choo, 2007; Hey et al, 2007).

Evidence from Ma and Lee (2012) suggests that incorporating an authentic learning strategy in higher education by providing real-world experiences can benefit students' learning and build their professional competence. This is similar to what is expected in the study of computer science students on industrial attachment. Students are expected to learn to investigate problems assigned to them in order to improve their problem solving skills. As students interact with their industrial supervisors who are their mentors and share experiences with their peers on the Facebook group, they also get empowered to be able to process information and work in a team. As they experience real life problems, students learn to communicate effectively and as well acquire and apply knowledge in solving real problems. Students can also learn and develop team building as well as conflict resolution skills as well.

The second study reviews the application of authentic learning principles to a design-based research study that explores the use of emerging technologies as cognitive tools to be used to solve problems within an authentic learning environment (Herrington and Parker, 2013). A first year compulsory university semester unit in a Bachelor of Education programme was designed according to nine principles of authentic by Herrington (2010). Five themes were identified as findings. First was fear of technology and being left in the shadows: Most students could not see the value of using Web 2.0 technologies and several felt that they could not cope with the rapid rate at which technology was moving. The second theme that emerged was a sense of achievement and liberation where most students started off uncertain of their abilities to accomplish the tasks but were excited when they were able to successfully complete the tasks. Next was introduction of a range of new software and technology that most students had not known or used. This changed their social, learning and professional

lives. Then a minority of the students felt that the teaching of the use of mobile technologies in a classroom setting was fruitless, as students were not allowed mobile phones in schools. Compared to the cost of the course students felt the teachers needed to do most of the work. Others however realised its value and said it added to their overall perspective of authentic learning environments. The work by Herrington and Parker (2013) applies authentic learning principles in a way that can inform this study in that authentic learning encouraged students to self-regulate their learning, become adept at researching, collaborating and reflecting. In the study of computer science students on industrial attachment, it is expected that by using social media students learn and adapt to the dynamism social media landscape in schools and society focusing on technology in everyday life (social), in university (research) and then in schools (pedagogical).

Another study reviewed aimed at contributing evidence for the potentially beneficial relationship between emerging technologies and authentic learning (Bozalek et al., 2013). The study is based on a research project conducted with 265 South African higher educators to explore their teaching practices for evidence of elements of authentic learning by Herrington et al. (2010). In the same vein the contribution of emerging technologies to achieving the level of authentic learning across the nine elements was also investigated and results of the study show that respondents applied these elements to various degrees. Authentic context and authentic task were the most commonly used. Articulation is least used, Herrington et al. (2010) suggests that this could have been perhaps because most higher education institutions often use exams for assessment rather than inquiry-based learning. Authentic assessment was also least used due to assessment policies of most institutions. It was suggested that the nine elements are better viewed not as absolutes but as continuums in the evaluation process. Findings confirmed that an intervention can be weak on one or two elements while presenting a substantially authentic experience for students.

The fourth study focused on an online professional development course for higher education practitioners based on authentic learning principles was designed and implemented (Parker, Maor and Herrington, 2013). Design-based approach based on a social constructivist model of learning was used to observe possible solutions for

designing and implementing effective online higher education courses. Evidence from this study suggests that aligning the critical components of authentic tasks with effective learning principles is a major challenge for instructional designers and practitioners implementing this type of approach. The research showed that an authentic approach provides useful and engaging theoretical design framework for participants who are able to commit personally and practically to online learning. Participant responses and facilitator reflections from the initial course were mapped against the elements of authentic learning and recommendations were identified for improving future iterations of the course. Recommendations were only made for three of the nine elements which are authentic tasks, collaboration and reflection. In authentic tasks, it was suggested that time ought to be increased and content reduced or tasks simplified. Secondly, in collaboration, peer review of analysis worksheets must be included. Lastly, it was recommended to use a different tool for reflection so participants can refer back to their pre-course survey. It was also suggested to replace the blog with a tool that is easier to use. This setting in particular shows that of all authentic learning principles, only some of the principles may be outstanding as compared to others which however may depend on the actual activities in which authentic learning is applied in the research.

Lastly in the application of authentic learning in education I describe a review of a study on implementation of authentic learning principles by Herrington and Oliver (2000) examined as criteria to evaluate authenticity. This was applied to the International Virtual Benchmarking Project (IBVM) at education institutions in 5 countries, across 8 online courses during the period 2009-2010. Results indicate multiple roles and perspectives and scaffolding as the strongly implemented elements. Collaborative construction of knowledge was implemented weakly. Development challenges were identified, such as the need for continuous authentic assessment. The project raised teachers' awareness of cultural background as a factor affecting views on authentic e-learning, and highlighted the need for differences in the cultural codes of e-learning to be considered when developing multicultural learning. Data were analysed according to how the learning environments applied principles of authentic learning. In this review, a more detailed approach to analysis of online data was seen as lacking. In as much as the idea of having conversations happening online in an authentic e-learning environment, there is need to apply an analysis methodology that can unravel detailed descriptions of

themes. This has been used to inform data analysis in the study of authentic learning in industrial attachment as application of conversation analysis on online discussion can be done in order to bring up descriptions of talk-in-interaction (Fitch and Sanders, 2013).

2.3.4. Elements of Authentic Learning

The pedagogical framework, authentic learning as espoused by Herrington et al. (2010), will serve as a pedagogical framework to guide this study in its quest to investigate the extent to which the Computer Science industrial attachment programme fosters authentic learning. Authentic learning comprises nine elements as follows:

1. An authentic context. This is an environment where students can learn and apply practical skills in solving real problems.

2. Authentic tasks and activities. These are the actual problems that a student leans to solve. Authentic tasks form the basis of Authentic Learning where the student learns to produce knowledge by working on real problems (Herington et.al, 2010).

3. Access to expert performances. As students are attached they learn from and are mentored by experts in the field, as well as other students connected to them via the Facebook platform in various levels of expertise.

4. Multiple perspectives. Students make use of knowledge being shared by other students who may be in better levels of expertise as well as experienced professionals. This element has similar qualities to the third element explained above.

5. Collaboration. Students are members of teams working together to solve complex problems. This applies well to the computer science context as projects worked on involve different experts putting effort to come up with a complete product e.g. when developing a software product there are a number of input areas including systems analysts, developers, networking engineers and database experts.

6. Reflection. This is where students begin to talk about their growing knowledge of problem solving as they explain the different skills applied and/learnt as they solved real problems.

7. Articulation. Students talk about their experiences during industrial attachment, by sharing knowledge of how they went about solving problems they are assigned to on the Facebook groups. As well, students submit two reports on their experiences as well as presenting a fifteen-minute talk about their experiences at the end of the industrial attachment break.

8. Coaching and scaffolding. Here, the tasks assigned to students are complex and allow a student to go through more of an incremental learning phase. Having access to the internet, as well as connections to colleagues via social networks, help them gain knowledge that they apply in coming up with solutions to problems.

9. Authentic assessment. This element was achieved by having university supervisors visiting the students twice during industrial attachment period, to see them at work as well as talk to the students and their immediate supervisors. A rubric was used to guide awarding of marks during these exercises.

The above review per element shows how the principles of authentic learning are significant to this study and the ways in which these elements may be applied to the study of knowledge sharing in authentic mobile-mediated contexts.

2.3.5. Summary of authentic learning in literature reviewed

Although there seem to be a similar way in which authentic learning has been applied to the different studies reviewed, there is a difference on how this application is possible in online and offline environments. This review has examined historical perspectives of successful application of authentic learning in online environments by educators and teacher educators. However a knowledge gap exists in the context where students are isolated during industrial attachment and lack the traditional interaction and

feedback. It is against this background that it is imperative to investigate the extent to which authentic learning exists in computer science discipline during industrial attachment as students become accustomed to the dynamism brought by social media landscape in university research and pedagogy.

In this study, a real world context where students adopt and experience how organisations use computer science to solve real world problems is investigated. The environment studied was not necessarily an online simulated classroom experience as most research into authentic learning show, students were solving real problems in the organisations they are attached, conversations amongst the students and researcher about their experiences shared on facebook group is analysed using conversation analysis. This is done to determine the extent to which authentic learning exists in computer science industrial attachment course. Achieving this standard for computer science graduates will mean that students are better prepared in their career than just fulfilling degree requirements.

2.4. Online Student-Instructor Interaction

The characteristics of an online environment have been suggested by Epp, Green and Rahman (2010) to have changed the way instructors and students interact from the face-to-face (F2F) environment. This is relevant to the study on students on industrial attachment who are geographically dispersed. Their experiences will be sourced from online interactions where posts are triggered either by the students or the university supervisor and communications are between participants who are geographically dispersed. This is consistent with the idea presented by Murray who notes that online discourse has a different nature from F2F interactions (Murray, 1986 as cited by (Epp et al. 2010)). Another study which focused on comparing peer interaction and student - instructor interaction suggesting the need for instructors in online interaction (Hew, 2015). This is said to have advantages on ensuring that discussion topics are guided continuously and a subject matter expect guiding student learning. These studies informed the researcher of the need to manage clarity of interactions by providing counterbalance posts in keeping with conversation flow, the need for additional

posts that give further characteristics or specific qualities of required information and testing accuracy of responses provided.

2.5. Conversation Analysis

Conversation Analysis (CA) is a research methodology dating back to the 1960s to 1970s period but being applied to research currently, impacting on practical situations as well as being of high significance in real-world applications (Robinson and Heritage, 2014: Hepburn, Wilkinson and Butler, 2014). Key researchers credited with the evolution of conversation analysis include Harvey Sacks, Erving Goffman, Emanuel Schegloff, Gail Jefferson, Anita Pomerantz and Harold Garfinkel (McHoul and Rapley, 2001; Have, 1999, 2007). This methodology has since developed from this stage and is now considered resolutely empirical in that analysts' first priority is to observe(record) and analyse the practices of people in naturally occurring conversations and from there to build up a knowledgebase about those practices (Fitch and Sanders, 2013).

Have (2007) defines CA as a process involved in the study of orders of talk-in-interaction, whatever the character or setting. CA gets its roots from the word conversation that is suggested to mean that people are talking with each other just for the purpose of talking, as a form of sociability or it can be used to indicate an activity of interactive talk independent of its purpose (Have, 1999). Psathas (1995) defines CA as the study of talk-in-interaction, which represents a methodological approach to the study of mundane social action that has achieved these desired results. Psathas(1995) also suggests that CA has developed rigorous, systematic procedures for studying social actions that also provide reproducible results. He also suggests that all aspects of interaction including nonverbal and non-vocal are also amenable to the study naming in Interaction Analysis. This notion agrees with other researchers who define CA is a methodological approach that grew out of phenomenology and ethno-methodology and is concerned with uncovering the rules and structures of everyday, mundane social actions as captured through verbal (and nonverbal) interactions (Mills, Durepos and Wiebe, 2010). Mills et al. (2010) postulates that CA takes as its starting point that all interactions are meaningful to those who produce them and that there is an underlying pattern of orderliness to even the most routine interactions.

2.5.1. Conversation Analysis applied to Classroom Interaction

Seedhouse (2013) discusses how conversation analysis has been employed to investigate interaction which occurs in second/foreign language (L2) classrooms. The overall picture of (L2) classroom from a CA lens is that it is a very complex, dynamic and fluid interactional environment (Seedhouse, 2013). Likewise, interaction in this study happens in an online platform where a community of people who were once involved in a classroom course are now dispersed. Seedhouse (2013) advocates for the need to examine micro-detail of classroom interaction that was made easier by the introduction of conversation analysis with studies demonstrating the existence of order at all points in L2 classroom interaction. One of CA's qualities that makes it fit into current research is its view of the nature of competence which is presented in CA as variable and co-constructed by participants in interaction conceived as a plurality of capabilities embedded and recognized in the context of particular activities. This has a direct resemblance of what happens during industrial attachment where students attached to different organisations, where they are both geographically dispersed and become part of different specific contexts, there is co-construction of knowledge through different experiences.

The mechanism of repair in relation to L2 classroom interaction is also noted. Seedhouse agrees to the works of Markee (2000), Liebecher and Dailey-O'Cain (2003) among others who suggest that conversation repair enables learners to comprehend input and the different repair types employed by both teachers and learners having a reflexive relationship to their roles. The work of Young and Miller (2004), Hellerman (2007), and Brouwer and Wagner (2004) is quoted by Seedhouse in relation to CA research into language iterating longitudinal studies that document the development of interactional patterns over time (p.3). The three research cohorts report that student participation moved from peripheral to fuller participation, learning can be conceptualised as the changes in the use of resources and strategies for engaging in a particular aspect of social interaction and learning a second language described in terms of increasing interactional complexity rather than the acquisition of formal elements respectively.

Seedhouse (2013) emphasises future directions of CA research into classroom interaction as highly likely to examine a wider range of languages being learned and

taught, using a wider range of teaching practices, activities and issues, in a wider range of classroom contexts. This is where this research finds a foothold in that CA research can also be applied to learning activities in an online platform connecting students attached at different organisations during industrial attachment break, where different ways of presenting ideas emerge and develop in a group of learners connected via an online platform creating their own order and orderliness.

2.5.2. Conversation Analysis applied to Online Learning

Conversation analysis has also been used to explore intercultural discourse in synchronous and asynchronous online learning (Gibson, 2009; Tundini, 2010). This gives a starting point on how this study can employ this technique for interaction that happens on an online social space. Gibson (2009) explores the ways in which conversation analysis is used and its focus on sequentiality and membership categorisation for analyzing culture as a textual interactional achievement on an asynchronous online setting.

On the other hand, Tundini (2010) demonstrates how conversation analysis was used as a methodology to understand how foreign languages are used and learned in a naturalistic online setting as a text chat. Both authors agree to online methods of teaching and learning language providing many of the benefits of face-to-face conversation although they lack some features which typify face-to-face communication.

The authors come up with interesting distinctive characteristics that were analyzed between the two types of online discussions (synchronous and asynchronous). For asynchronous discussion forums, Gibson points out problems with working out the organisation of talk through sequential turns citing that conversations online are normally distributed across time and do not ‘always’ occur at a given temporal point as compared to face-to-face conversations while Tundini (2010) mentions variability in typing speed in online text chat impacting on the length of delays between the three-tiered process of production posting and reading by co-participants also differentiated from aural and face-to-face interactions. The two authors strongly agree on the affordance that comes with online interactions where participants are able to think out information first before posting

and can be able to monitor their own writing process and view posted messages in an electronic transcript of the co-constructed conversation, which can be scrolled for reviewing. These issues have been seen to match the current context where CA is being applied.

2.6. Use of Facebook in Education

The use of social networking sites for educational purposes is now widely accepted with Facebook listed as one of the most widely used social networking site (Bialy, Jalali & Jaffar, 2014). As previously alluded to in the introductory chapter, Facebook is one of the famous social networking sites that facilitate online social interactions that typically focus on sharing information with other users referred to as “friends” (Sullins, 2014). With the continuing explosion of knowledge and the breaking down of the old fixed patterns of employment, students are increasingly demanding a type of education that allows them to update their knowledge whenever necessary and to go on doing so throughout their working lives (Prakash & Gupta, 2015).

The use of Facebook in education has changed the way students learn and this calls for the need for education systems to respond by changing traditional pedagogical methods. Previous research by Bialy et.al (2014) showed that Facebook can be effectively incorporated in science education, providing learner engagement and motivation. Their research showed that Facebook was effective for collaboration, exhibiting multiple perspectives and for providing formative assessment. This is considered key in this study as it aligns well with the principles of authentic learning that this study seeks to investigate. The talk in interactions shared on the Facebook group will help the researcher learn the extent to which authentic learning exists during industrial attachment of the computer science programme.

2.7. Conceptual Framework

The conceptual framework underpinning this study is described and illustrated by a diagram that follows see Figure 1. The diagram shows a social network with two

Facebook groups created for computer science students who were on industrial attachment break to share their experiences.

In Figure 1, I have presented the computer science programme focusing on industrial attachment which is the third year of study in this programme. In the first case, students shared experiences during industrial attachment, the second case represents experiences shared post industrial attachment.

An authentic learning framework by Herrington et,al. (2010) was used to guide questions posted on the Facebook platform to spark discussion around students' experiences. Conversation analysis was then applied as an analytical framework for analyzing the posts made by participants. These analyses were further mapped on the authentic learning framework in order to understand the extent to which authentic learning exists in industrial attachment as part of the computer science programme.

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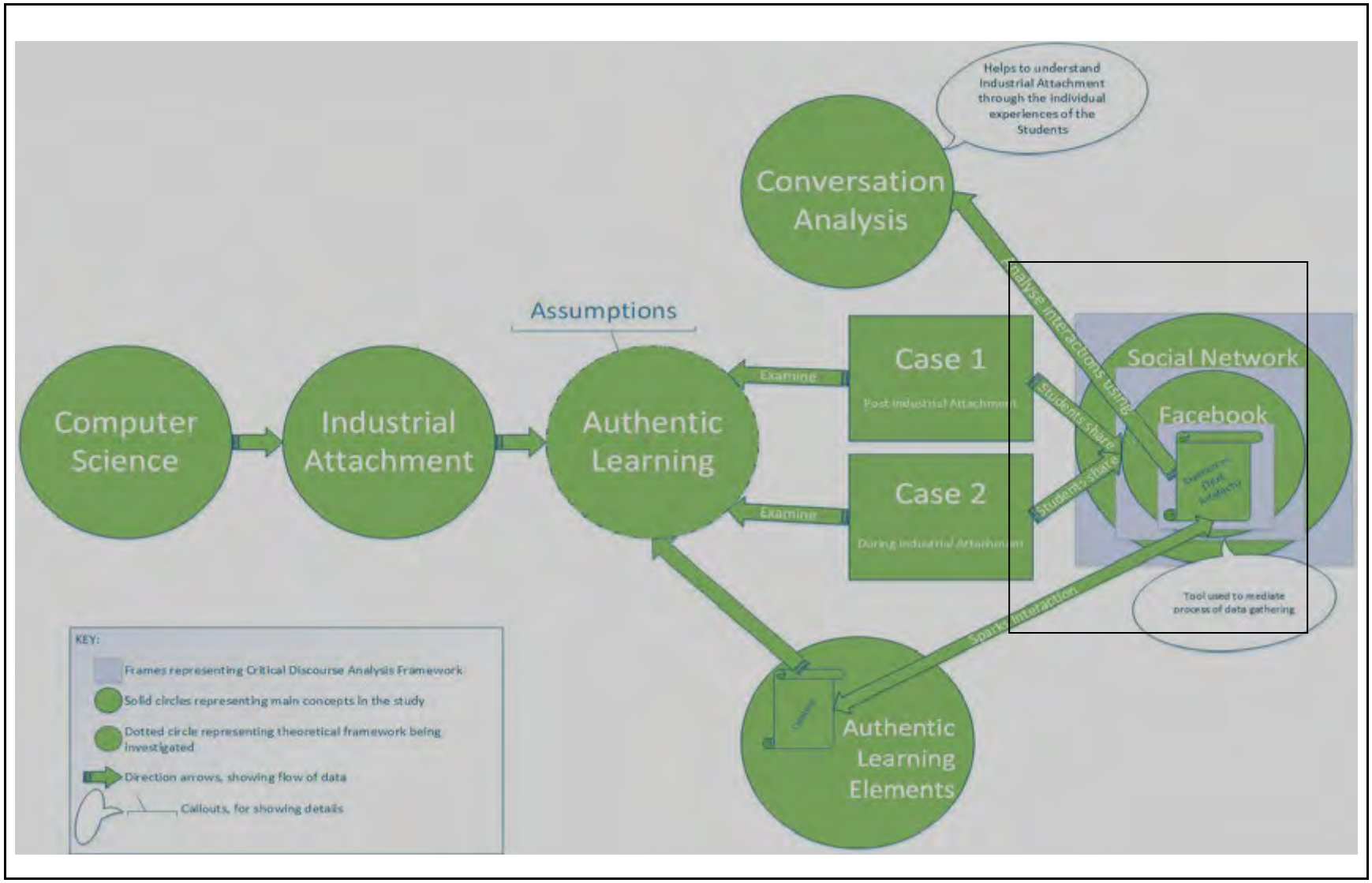

Figure 1: Conceptual Framework

The use of social network, in particular, interactions in Facebook groups enabled experiences to be shared resulting in text.

2.8. Chapter summary

This chapter provided an overview of literature guiding this study. The conceptual framework which includes a description of the computer science programme, authentic learning theoretical framework, conversation analysis and the structure of the study is discussed. Relevant literature, reviews and reports were studied to shed more light on the application of authentic learning to the industrial attachment case study. The next chapter details the discussion of the methodology of this study.

Chapter 3: Methodology

3.1. Introduction

This chapter provides a description and explanation of the research process that will be followed to investigate the extent to which the nine elements of authentic learning exist in computer science industrial attachment programmes. The chapter is presented in ten main sections. The first part of these sections describes the context of the study in terms of the study setting and conditions relevant to the study. Discussion of the research orientation follows. An outline of the type of research is then briefly described, followed by an explanation of the research approach. The next section details information about participants in the study and selection criteria used. An explanation of data collection process follows, together with a brief discussion of how data was analysed. After this comes the discussion of validity considerations, ethical procedure of the study and a discussion of the research procedure. Finally, a short summary of the overall method adopted in this study marks the end of the chapter.

3.2. Description of Context

This study was carried out in the Industrial Attachment (CS300) course for the Computer Science degree programme in the Faculty of Science at Bindura University in Zimbabwe.

Third year computer science students registered for the CS300 course work on real problems with real clients at the organisations they were attached. Students receive recommendation and support letters from the department that they use to look for industrial attachment places at different organisations. Some organisations request for students directly from the university while others just advertise with newspapers or online. During the industrial attachment period, each student is mentored by an organisation supervisor or expert in the department they are working. From this mentorship, students come up with useful products (solutions for real problems) for

clients during their industrial attachment period. The course CS300 Industrial Attachment enables or assists students to apply theory acquired during the first two years of study at the University. The third year of study is part of a learning process and a student acquires credits quantified to 30% of their overall degree class calculation. It aims to provide students with opportunities to observe the management operations and the work life in a typical business organization (Faculty Industrial Attachment Policy, 2013).

At the organisation that a student is attached, the student engages in a variety of professional work designed to provide a total learning experience. Learning outcomes of industrial attachment include being able to solve real-world computer science problems by producing high quality solutions using current technology, understanding how to participate effectively as a team member and being knowledgeable of general ethical principles and practice of computer science discipline. Through their immediate supervisors, students receive hands-on mentorship on activities and programmes of the respective organisation.

From previous attachment assessment, a department brief highlighted that some supervisors (organisation experts) indicated that once they have accepted a student for attachment, they go through tasks assigned to them together with the student. For critical jobs, students only work with simulations of the real problem and are taught how to solve, they can only be allowed to work on the 'live' systems when they have gained satisfactory experience needed.

Industrial Attachment allows students to acquire basic understanding of the goals, structures, functions and operations of an organization and makes students to appreciate Zimbabwe’s main industrial sectors and their interdependence. Also it provides employers the opportunity to assess students for possible future employment. However, at the end of the attachment students should be able to demonstrate attitudes and personal values in line with the requirements of working in the specific sector as well as identifying their own strength and weaknesses with regard to employment.

During attachment students are expected to promote the good name of the university by conforming to the organization’s regulations and discipline. They are expected to have a good relationship with all the staff members of the organization, so

as to not affect the future attachment placements and the relationship between the school and the organization.

On the other hand, an organization is advised to provide students with opportunities to function like full time employees and permit them to actively participate in all aspects of the business management and administration except where confidentiality matters do not permit the participation. There should be a job rotation scheme and preferably equal allocation of time to each functional area so as to enable students to be exposed to different functional areas of host organization. The organization will have to assign a member of them to work with and act as a mentor and supervisor to the student. The mentor will assist and assess the student throughout the placement period.

Both student and supervisor draw up an outline programme of activities to be undertaken during the placement period so that students will learn the methods of conducting research, analysis, presentation and report writing. Students will therefore write reports reflecting on industrial attachment experiences. They follow department guidelines given highlighting progress made as well as problems encountered which will be submitted to the organisation supervisor. The supervisor signs the reports, checks on the accuracy of the information submitted and screen for confidentiality and pass information for publication. During the Industrial Attachment period, academic supervisors from the university visit each student twice. This is done so as to maintain contact with the student and the organization and to assess the performance as well as the progress made by the student. Students must show initiative, creativity and take responsibility for tasks and actions at the workplace.

The students who participated in this study were part of two private Facebook Groups, one created by one of the students and another created by the researcher. Only the members of the groups could view, post and respond to posts in the group. The purpose of these groups was to interact and share knowledge and experiences of the industrial attachment break. Students who were already having Facebook accounts were invited, and only those who were willing to participate in the study joined the study group.

3.3. Research Orientation

Social interaction is based around three principles which are consciousness (where we are aware of both ourselves and our relationship with others), action (where people make deliberate choices about how to behave in different situations) and unpredictability (where behaviour can be unpredictable), however reality is individually constructed based on personal life experiences. A number of paradigms can be adopted in order to understand some philosophical assumptions underpinning research for example feminist, positivist, and interpretive.

Feminist paradigm distinctly draws on women's experience of living in a world in which women are subordinate to men, that is feminists are concerned with the implications of the exclusion of women's knowledge and experience of the traditional male construction of knowledge (Landman, 2006). This approach was not appropriate for this study as both sexes are already represented.

Positivist perspective involves a definite view of social scientists as analysts or interpreters of their subject matter claiming that science provides us with the clearest possible ideal of knowledge (Cohen, Manion and Morrison, 2013). Positivism becomes less effective in its application to the study of human behaviour important characteristics of humans including values, informed opinion, moral judgements and beliefs (Cohen et al., 2013). This research orientation fails to address the study in question where students are learning by experiencing varied social systems in a real world context.

On the other hand, the interpretive paradigm is characterised by a concern for the individual with the central endeavour to understand the subjective world of human experience (Cohen et al., 2013). Interpretivist perspective can be described as a constructivist theoretical framework for most qualitative research that sees the world as constructed, interpreted and experienced by people in their interactions with each other and wider social systems that is, a qualitative research method where words and pictures as opposed to numbers are used to describe situations (Carcary, 2009; Tuli, 2010).

Interpretive paradigm is suggested to be best suited for studies specifically targeted on a particular context with the purpose of understanding a particular phenomenon of a real-world situation unfolding naturally and not to generalise to a population. Qualitative studies have been considered to be interpretive and descriptive studies in which students and settings are not usually manipulated by the researcher (Savenye and Robinson, 2005). In this study, an interpretive paradigm was used as it was seen to be best for understanding how students applied the nine elements of authentic learning during industrial attachment break (Denzin and Lincoln, 2000).

3.4. Type of Research

The study employed a qualitative research methodology with the aim of understanding and representing the experiences and actions of students on industrial attachment as they encountered, engaged and lived through real-world situations (Elliot, Fischer and Rennie, 1999; Maxwell, 2005).

Qualitative research is defined as “multi-method” in focus involving an interpretive naturalistic approach to its subject matter (Denzin and Lincoln, 2004 cited in Sayene and Robinson, 2005). Qualitative research methods were originally developed in the social sciences to help understand people and the social and cultural contexts within which they live (Myers and Avison, 2002:2).

In this study qualitative research is defined as research devoted to developing an understanding the way computer science students experience authentic learning during industrial attachment break. This research is conducted in a natural setting, without intentionally manipulating the environment. The study attempts to make sense of, or interpret phenomena, in terms of meanings people bring to them (Savenye and Robinson, 1996; Savenye and Robinson, 2005). The approach to qualitative research in this study falls within the subcategory of conversation analysis where a strong focus has been placed on analyzing interactions in everyday talk (through asynchronous discussion) (Flick, 2014).

3.5. Research Approach

The qualitative research strategy chosen to best suit this type of study is a case study approach. A case study is defined as an empirical inquiry that investigates a contemporary phenomenon within its real-world context, especially when the boundaries between phenomenon and context are not clearly evident (Yin, 2009 cited in Yin, 2013). Harling (2012) defines a case study as a holistic inquiry that investigates a contemporary phenomenon within its natural setting. Case study research is further defined in a broader perspective as an inquiry that focuses on describing, understanding, predicting, and/or controlling the individual such as a person or group (Woodside, 2010).

In this study, a case study is justified in that, although participants connect through one online platform which can be referred to as a single case, these participants are not exposed to the same environment as each organisation has its own structure that can either similar to another or completely different. This means that experiences that students share on a particular thread can be analysed as the researcher acquires data resulting in describing, understanding, predicting, and/or controlling the individual case on different postings.

Qualitative researchers have been suggested to employ strategies such as case studies in which one setting and one set of students and instructor is described (Savenye and Robinson, 2005). The goal of the study as suggested by Savenye and Robinson, (2005) will be to yield insight into human activities and opinions from the perspectives of the participants. Details of multiple voices of the selected participants will be described and compared.

3.6. Selection of Participants

Two groups of students were chosen in the case study. There was purposeful selection of the groups to be studied. These were students with whom the researcher had created a relationship with in a traditional face-to-face classroom. These two groups consisted of students in the computer science programme who were on industrial attachment break within the years 2012 to 2013 and 2013 to 2014 respectively.

The first cohort, 2012-2013 had a Facebook group named Developers, which was created by one of the students. This Facebook group was created by students during their second year. Facebook groups had been previously used in some of the theoretical courses the researcher had taught this group. I was invited as an academic supervisor to become a participant and assist students whenever they posted questions and contributions on the platform.

The second Group 2013-2014, is the one the researcher created and named Attachment Experiences. It was created as a support environment for students as well as a means of collecting data for the study. My position in this group as a researcher was to post questions that sparked conversation about industrial experiences as well as help out students who posted questions. Since I had used Facebook groups with these students before, I noticed that students had now built confidence in posting. Therefore, I had already built a social relationship with them beforehand. I also observed student activity on the platform and posted to keep interaction going. A set of guidelines relating to how best students were expected to make use of the platform where uploaded on the group. This was in form of a manual of what the researcher expected the group to achieve and how students could make the environment conducive for sharing their learning experiences. The following points were emphasised:

1. You are to post Computer Science related Issues. This may include what you expect to learn or are learning during industrial attachment, your current learning experiences, questions to other members on how to complete certain tasks assigned to you. Responses to other people's questions, links to important websites where students get "How to" information when looking up a solution to a certain problem.

2. Share what you are experiencing that you think will help another student in the same situation.

3. Ask Computer Science attachment related questions. To ask a question, we use the **Ask Question** icon.

4. Add a picture/video, use the **Add Photo/Video** Icon. This can be a picture/video that can show a process or how to do something.

5. Add a file that is can be a handout that any other student can refer to. Use the **Add File** icon.

6. To share, use **Write post** icon.

7. You are encouraged to respond to the posts in a particular thread only when posting. Not to confuse ideas, otherwise other students will not be able to follow. If you need to introduce a different subject, you will need to create a new thread.

8. You are expected to contribute. This group is meant to give timely support to others, so everyone else values your contribution.

3.7. Method of Data Collection

In this study, two Facebook groups were used to collect data. The first Facebook group (**Developers**) was initiated by students on industrial attachment for the period 2012-2013. The researcher had taught the students theoretical courses in their first and second years of study. During this time both face-to-face and e-learning was used in the course. Specifically, to e-learning, a number of platforms were used including asynchronous discussion fora on a Claroline[1]learning management system, wiki, podcasts and Facebook groups.

Similarly, the second group had used learning management systems in some theoretical courses the researcher had taught them. I had also introduced Facebook groups to one of the courses I taught them. However, for the second group, I created a Facebook group (**Attachment Experiences**) and invited all students who were on industrial attachment for the 2013-2014 academic year.

[1]*Claroline Learning Management System: Available at www.claroline.com 20/09/2014*

The nature of the study required data gathering methods that are sensitive to context as suggested by Newman, (2003). This was employed by ensuring that the Facebook group was private and could only be accessed as well as contributed to members of the group. Also the study required a platform which can enable rich and detailed or comprehensive description of social phenomena by encouraging participants to speak freely and understand the investigator's quest for insight into phenomena that the participant has experienced (Tuli, 2010). This was also met as the participants in the Facebook group had once related face-to-face.

3.8. Data Analysis Methods

Document and artefact analysis of online activity of participants are the data analysis methods employed in this study. This will be done in the form of examining online chats as narratives and comparing the multiple voices aired out by participants in selected discussion threads and observing how they were responding to posts (Savenye and Robinson, 2005).

Conversation analysis - the study of talk-in-interaction, an analysis methodology commencing through the works of Harvey Sacks in collaboration with Emanuel Schegloff and Gail Jefferson involves empirical studies of specific observable interactional phenomena (Wilkinson and Kitzinger, 2008). This method that was chosen in this study to analyse Facebook interactions of students and the researcher. This analysis method was employed in this study basing on the following three fundamental theoretical assumptions by Heritage, (1984) cited in (Wilkinson and Kitzinger, 2008):

1. that talk is a form of action

2. that action is structurally organised

3. that talk creates and maintains inter-subjectivity

From the assumptions listed above, the – "Talk as a form of action"- theory focuses on what people do with talk rather than just what they say. In this study, actions

that constituted a particular institutional context that is, how computer science students do talk about their industrial attachment experiences are analyzed.

The second assumption namely “the fundamental structures of talk-in-interaction” upon which all actions depend establishes technical specifications of the rules and practices that structure talk-in-interaction. It considers how these structures constrain and enable particular actions. Here issues such as turn-taking and repair in interaction are studied.

The last assumption, which is - talk creates and maintains inter-subjectivity, depends upon displayed understandings of prior talk. This has been investigated in this study as students posted responses to different discussion threads either posted by supervisor or other participants. A turn is hear-able as an answer to a posting being studied. For example, when agreeing to a post by a specific participant. This means that analysing a response shows how a person has understood what was being communicated. Another way is in giving an answer to a question on what is investigated in this study as talk creating and maintaining inter-subjectivity.

3.9. Validity and ethical Issues

Savenye and Robinson (2005) suggests that although issues of control in qualitative studies are not as relevant as in experimental studies, issues of validity, credibility and integrity are still very important. As research is prone to bias and reactivity, check listed items in the validity tests suggested by Maxwell (2005) were employed in order to make the research as valid as possible. These are discussed in brief below:

1. “Rich” Data / Intensive Long-Term Involvement: Facebook groups created and observed over the industrial attachment break were used to establish a community where computer science students freely shared learning experiences and helped each other achieve the set objectives. As these students were isolated from peers during the period of industrial attachment, the Facebook platform became a means of joining these students into an

online social community for affective support. Online presence of each student was of paramount importance to the study. This meant that the researcher observed the students' presence on the platform continuously. In cases where activity was low, the researcher would post questions in an attempt to keep the participants active and sharing information. Reposting questions, adding posts to emphasize and or repair in interaction enabled the researcher to collect "rich data" that is, detailed and varied data enough to provide a full and revealing picture of what is going on (Becker, 1970 cited by Maxwell, 2005; Seedhouse, 2013).

2. Intervention: Maxwell points out that the researcher's presence is termed an intervention that cannot be avoided in publication, this is not an exception in this study. The researcher suggested positive intervention that can lead to the desired goal of the research which is to have students share their experiences and help each other in a social community created online. An example of the scenario explained by Maxwell when he cites Goldernberg is a possible intervention that can be implemented in this research (Goldernberg, 1992, cited by Maxwell, 2005) informed these actions.

3. Respondent Validation: This was done by soliciting feedback from the group of students being researched in form of questions directed to students' postings. As Maxwell (2005) put forward, it is a way of ensuring that the researcher rules out the possibility of misinterpreting students' positions in the social networking platform.

4. Triangulation: Triangulation is sourcing information from a diverse range of individuals and settings using a variety of methods. In this study, triangulation was achieved in form of general observations on what transpires on the social networking platform as students contribute to different discussion threads and getting more views from students' postings by prompting them with explanation questions in the asynchronous discussion.

All students were aware of my research interest to study interactions happening on the Facebook group. Permission was sought (following the ethics guidelines from the

faculty) on the day of the second face-to-face event to use the discussions ongoing on the online platform for this study and all members agreed, see Appendix C-5. Informed consent letter was signed by participants.

3.10. Research Procedure

1. Two Facebook groups were created and participants invited. One was student initiated and the other was researcher initiated.

2. Rules were suggested and agreed.

3. A consent form was designed and approval was sort for collection and use of data for academic research.

4. Long term observation of posts/interactions on the Facebook group.

5. Collecting data from postings shared in a natural context.

6. Posting of questions on the Facebook group to spark interaction.

7. Collecting of data by extracting discussion threads from the Facebook group

8. Detailed conversation analysis of the discussion threads based on analytical framework described below.

3.11. Analytical Framework

Literature has shown that most of the research in which Conversation Analysis (CA) was used tended to be on tape-recorded conversation, recorded phone calls and video. Therefore, process of analysis included transcription and to some extent the definition and selection of data (Margaret et al., 2001). Recent uses of CA has focused on many areas including CA as intervention in the medical sciences, as a tool to analyse both synchronous and asynchronous data and to observe user interactions across social

networks (Robinson and Heritage, 2014; Meredith and Potter, 2013: Lucia, Akcora and Ferrari, 2013). The kinds of interpretative and reasoning procedures that conversation analysis seeks to identify are thus displayed in the trajectory of language use, which is organised on a turn-by-turn basis. It is for this reason that conversation analysts place great emphasis upon the examination of sequences of interaction, rather than, for instance, the detailed analysis of utterances that have been extracted from the sequential context in which they occurred. This in turn means there is no specific recipe for carrying out conversational analysis. There are variations in the ways different analysts proceed. Robinson and Heritage (2014) uses CA as an intervention while Lucia et al. 2014 focus on the problem of how a post is liked/tweeted by social network users across Facebook and Twitter. What is however common to all conversation analyses research, is the application of conversation analytic mentality coined by Schenkein (1978). He contends that conversation analytic mentality is a way of looking at data in such a way as to begin to develop an appreciation of the organised practices which inform interaction. Data should be looked at carefully with the aim of producing as formal a description as is possible of what is going on.

In this research, discussion threads from Facebook Groups were used as the data for analysis. The following processes were employed on specific discussion threads in order to analyse data:

1. An original record for the data in a particular thread to be analysed must exist in the discussion thread on the Facebook group.

2. From the discussion threads in a particular group, select a thread(s) sample(s) in which the interactants (researcher and students) discuss relevant course-related matters. In the case of the Facebook group for students on industrial attachment, a thread(s) on discussions on students' experiences, questions and request for information were used.

3. Extracts of information on selected threads were then copied and pasted to a word document. This becomes the first transcript.

4. On each transcript, the researcher records the personal names of interactants. The researcher makes a record of every instance of a personal name and its contradictions that is in some instances of conversation, a person can be referred to by a ‘nick-name’.

5. Change the interactants’ names in the first transcript.

6. Note: Permission was granted by the members of the secret Facebook discussion groups to use the discussion threads for research by signing an informed consent with the promise that their talk would be published in a form that will not identify the individuals personally.

7. Transcripts were then transformed to different phases by adding any notes on anything more that the researcher may discover fir example how many likes, how many people saw the post, date and/ time.

8. Analyse discussion threads to find out how industrial attachment experience is talked about.

9. Analyse structures of talk in interaction for example turn taking, repair in interaction, inter-subjectivity.

10. Analyse other text talk language shown by use of emoticons, click of like button, use of capital letters

11. Note: stage 8-9 was iterative, each iteration will serve as a transcription stage.

3.12. Chapter summary

This chapter provided a discussion of the research process followed to investigate the extent to which the nine elements of authentic learning exist in computer science industrial attachment programmes. The next chapter provides a detailed discussion and analysis of the findings of the study.

Chapter 4: Findings, Analysis and Discussion

4.1. Introduction

This chapter focuses on the analysis, findings and discussion of the data collected in this study. Data was collected and then processed in an effort to find answers in response to the research questions discussed earlier in the first chapter (see Section 1.3.) and to help determine trends and relationships among the variables underpinning the theoretical framework. The goal of the research informed from the research questions, was to investigate the extent to which authentic learning principles exist as computer science students are on their industrial attachment break. This investigation was conducted by analyzing conversations of these participants during that period. Assessing students based on one or two industrial visits only guided by a rubric cannot give a clear picture of students' true experiences during this period. Hence these objectives were accomplished and the findings presented in this chapter demonstrate pedagogical insight on how to effectively support students on industrial attachment break as well as getting a more informed view of their lived experiences during that period.

In this chapter, a description of biographic and background information of the participants commences. This is discussed in terms of gender, age and experience in order to provide some insight in general characteristics of participants studied. Participants are described in two separate cases as there are two different groups of students who participated in the study. Analysis of data follows for each of these cases, first with a discussion on the role of Facebook in preparing students for the final evaluation, secondly a conversation analysis of data from the Facebook posts and lastly by mapping the responses from the two cases and analyzing them using Herrington et al's (2010) authentic elements.

4.2. Analysis of the Research Context

Two cases form the of participant groups from where data from this study was gathered. The first case, Case 1, comprised of a group of students from the computer science department who were in their third year of study and enrolled for the course CS300 industrial attachment during the academic year August 2012 to July 2013. One student created a closed Facebook group named **Developers** and added his fellow classmates. The description of the group was aimed at creating an environment where computer science experiences and advice could be shared, and students could contribute to finding solutions to problems shared on this platform.

An invitation was also sent to me, the researcher in this case, requesting me to join the group and be part of discussions that would be ongoing during the attachment period and after as a computer science community. I agreed to join the group, which had a total of 13 members at the time, 12 of which were students on attachment. I had previously taught these students in some of the courses in their first and second year and had introduced Facebook groups and discussion forums on the local learning management system where we discussed course related issues. It is important at this point to note that I had two roles in participating in these groups. First, as the researcher I was observing knowledge and experiences shared on the group from inside as a participant as well. Secondly, since I had once taught previous theoretical courses to this group and implemented social media in the teaching and learning of concepts, I had already created an environment where students are able to collaborate naturally even in my virtual presence.

As the year went by, I saw a potential of researching on students' experiences during industrial attachment. Three face-to-face events were created on the group platform see Appendix B - Figure 11, I created the first two (general meeting in order to share experiences) and another student created the third one. All members managed to attend the first two events but not all of them subsequently managed to participate continuously on the Facebook platform. Of all group members, an average of 5 members contributed most to postings being made on the Facebook platform. Most students (~4) who were not participating cited problems to do with social networks being

restricted at the organisations they were attached. The following, Figure 12 extract is a quote from a private message I received from one student who failed to participate after I had asked why they had been quiet:

"...the challenge is if our supervisors find us on Facebook they just assume that we will be playing around during working hours and during off hours the challenge is data bundles..."

Other participants complained of pressure of work which made it difficult to get time to reflect and communicate with others on the platform. Another quote from a student, extract from Figure 13 follows:

"...Sorry maam, I had been hooked up by something else at work - too much pressure. anyway I'm going to try using your programme on my mobile...."

After considerations of the issues mentioned above, the researcher purposefully selected students who participated on the Facebook groups, to be the ones whose postings were analyzed. In Developers group, that is Case 1, five (5) students participated effectively therefore these were selected. The following table shows details of five students whose contributions are analysed in case 1 of this study. Details of the students are presented in terms of 1) Pseudonym given, this is in form of initials used in the analysis of the conversations 2) Age, 3) Gender and 4) Roles played at organisation attached.

Table 4—0—1: Case Study 1 ~ Developers Group

Industrial attachment Position/Roles	**Gender**	**Age**	**Pseudonym**
Academic Supervisor/ Researcher	Female	31	TMLR
Hardware, Help Desk Support, Networking, System administration	Female	24	PTDMS
Web designing, System administration, Hardware and Network troubleshooting.	Female	23	FHS
Created Facebook group, Junior software developer and Assistant Systems Administrator	Male	25	MMS
Hardware and Network administration	Male	23	VNS
Network engineer assistant, network cables and desktop assistance	Male	23	TMS

From joining the **Developers** group, I later created another group, **Attachment Experiences** which initially comprised of 18 members. I created the new group upon realising that what students shared on the platform would help them during the time they were attached. The group of students that were now due for industrial attachment needed an initiative to start a community were experiences could be shared.

Attachment Experiences group, was created also on the foundations of lessons learnt and observations made from conversations and interactions happening on the **Developers** group. In this study, **Attachment Experiences** group of participants' post are analysed as Case 2. Sixteen participants in this group were students registered for their third year in the CS300 course for the academic year August 2013 to July 2014. One fourth year student was invited to this group to help as a mentor to the current group as well as being one of the administrators of the secret group.

As this group was a *secret* group (A Facebook group that is created a secret group only allows people that are members to see the group, postings as well as to post on it), only members of this group could see the discussions happening as well as post contributions. The group had eighteen members. In this group my role (declared and consented by group members) was to participate as a supervisor and as the second administrator. This group had two administrators who were able to approve posts that were being made by all participants. Similar to the first case, I had previously taught this group in face-to-face courses during their first and second year of study. Approximately a quarter of the students were not very active in participating in the group's activities. From chatting with one female student, see Figure 13, the following is a quotation of her response to a message I sent to her in an effort to try and motivate her to participate:

> *"...Hi madam. I will try but my English is very poor so it makes it difficult for me to participate. You will have to read it and help me edit before I send it..."*

In the same way, ten (10) students who participated in the Attachment Experiences group, that is Case 2 were selected for the study. The following table shows details of students whose contributions are analysed in case 2 of this study. Details of the students are presented in terms of 1) Pseudonym given, this is in form of initials used in the analysis of the conversations 2) Age, 3) Gender and 4) Roles played at organisation attached.

Table 5—0—2: Case Study 2 ~ Attachment Experiences Group

Industrial attachment Position/Role	**Gender**	**Age**	**Pseudonym**
Academic Supervisor, Administrator on Facebook group/ Researcher	Female	31	TMLR

Administrator on Facebook group, Junior software developer and Assistant Systems Administrator	Male	25	MMS
Software Developer, Systems Administrator	Male	24	MBS
IT Audit, PC Maintenance	Male	22	PPHS
System administration, Hardware and Network Admin	Female	28	PDS
System administration, Hardware and Network Admin	Female	23	GCS
Systems Admin	Female	25	SMS
Software Development, Value added services testing	Female	23	MHS
Help Desk management	Female	24	TAMS
Administrator, Customer Services Agent	Female	23	CMS
IT officer, PC Maintenance, Network Support	Male	25	BNS

4.3. Qualitative Interpretation of Results

In order to answer the research questions, stated:

1. How does authentic learning happen during industrial attachment?

2. In what ways can knowledge sharing and or authentic learning be fostered using social media among geographically distributed learners?

3. What are students' perceptions of the industrial attachment programme?

Postings from students' interaction on the Facebook groups were analysed to inform the researcher on which elements from Herrington et al. (2010) the students were exposed to. Questions were framed from Herrington et al. (2010)'s nine elements of authentic learning and were posted on the platform.

4.3.1. Conversation Analysis

1. Turns at talk and turn taking

Turn taking is seen in the way the conversations happened in threads, where one post from a participant is followed by another post either from the same participant or from others. These posts are automatically arranged according to the time when the post was made. Each table (table 5-1 to table5-31) shows that one speaker takes a turn, followed by another speaker. For example, *PPHS* posts a thread *(Table 5-1: Unit1 ~ Student asks question on Attachment Requirements Line 01 to 05):*

"hello guys, Thanks once again 4 the group. What is the first thing to do once one gets attached in terms of what forms to be filled in and by when they should be sent to school?"

TMLR takes the next turn *Line 07 to 10*directly responding to the question by giving the student option as follows:

"...You are expected to communicate as soon as you are attached. Check out the documents I uploaded earlier on this platform..."

In this instance, the supervisor directs a student to check documents previously uploaded on the platform containing guidelines for students who have started industrial attachment.

"...Other students who have already done this stage can feed us with more details on this. @ MMS and MBS, if there are any other forms you filled out besides the documents I uploaded please give us details..."

There are variations seen in the size of turns that is in the order in which participants take turns and in what they say for example *PDS's* turn in *Table 5* may comprise 47 words whilst *TML's* next turn consists of 15 words, as well as *GCS's* turns from *Line 08* to *Line 10* consists of multiple turns. Participants are seen to construct their turns at talk out of units which include a few words, single sentences/phrases or any combination of these. These turns can therefore be concluded as grammatical units which are building blocks out of which turns at talk are constructed out of one unit or multiple functionally differentiated units.

2. Turn Design

Turn design is seen from this thread in that after the researcher *TML* posts a question at *12:39pm, March 3, 2014* , a response follows and is posted by another participant that is*MBS at 7:48am, March 4, 2014.* The response to the question on *environment* by MBS in this case shows that the speaker selects what action the turn will be designed to perform by answering:

"Well as for me I was exposed to an environment that was far much beyond my abilities."

It also shows from the subsequent sentences following this sentence in that the speaker selects the details of the verbal constructions through which the action is to be accomplished. Another post shows a move of the topic of conversation by *TML* as this participant directs response to the previous speaker seeking clarification of a point made and the successive response from *PDS* shows a confirmation of the turn in the new direction.

3. Social Action

Here the response from participants show how they understand the prior speakers' conduct for example, responses show explanations of how participants view the environment and work contexts at organisations they are attached and each one gives detail of their experiences. Some responses give a description of how the participant viewed the complexity of the environment and the basis on which they arrived at that understanding. For example, *MHS* explains the challenges faced and shows where and how she contributes to tasks assigned to her. When this participant states:

"The industrial attachment is going well but full of challenges especially when you don't know what is supposed to be done"

and

"you have to explain the reason why you haven't met the timeline in the weekly meeting and this has boosted my work performance since you will be working according to a target"

This defines the degree of complexity of the environment, how the tasks are ill defined and yet the timelines are tight take time to be solved.

4. Sequence organisation

Turns in this discussion thread are connected with one another in systematically organised patterns. For example, the first speaker *TML* asks, then the next turns of participants are responses to the question. *TML* specifically changes direction from original question topic as a question is intended for the previous speaker using @

symbol. As soon as *SMS* responds the following turn by *MHS* show that participant' response was an answer to the initial question asked in the thread.

4.3.2. First Element: Authentic Context

Case 1: Question posted by researcher on the platform:

"Are you busy connecting network cables, troubleshooting, changing a power supply unit, changing printer rollers, coding, blowing desktops or even shredding paper? Share your photos and let's see you at work on Industrial attachment. If you are shy you are allowed to hide your sweet face!!!"

Responses that show an authentic context

One student *PPHS (full details of post on Table 4-14: Unit 12 - Lines 13 to 20)* posted a response that explained a specific scenario where both skill and knowledge was to be applied. The student explained the scenario as follows:

"Optic fibre junction box...the company was moving over to fibre network and we got the opportunity to experience its setting up and configurations.
In the images, we were cleaving and splicing the optic cables, bridging from the mother fibre to the main switch of the IT dept.
The second picture shows an existing underground fibre cable where we were branching ours from"

This response shows that the environment where the student was attached was a physical environment reflecting the way knowledge will be used in real world which is a characteristic of an authentic learning context. The idea of adding pictures to the post helped in getting a deeper understanding of the complexity of the task as well as portraying a desired context. Similar to this, the same student posted a question which depicts another real world scenario:

PPHS (Table4-10: Unit 10 - Line 02)

"I have a question guys.... has anyone come across a problem whereby your excel document wont print bolded text as bold here, print preview window shows your document with bold but the hard copy doesn't come out in bold.... anyone to help"

This again showed that this student was being exposed to a space where ideas can be explored at length in the context of real situations. Response to this question by the supervisor showed how mediation can occur in such a way that, rather than telling a student the answer, the supervisor points a student to resources that the student can use in order to come to the solution of the problem as shown in the response below:

TML (Table4-10: Unit 10 - Line 03 to 10)

"I have never come across that problem. However, I tried to do a search online and it says you can try to change font, maybe your printer is failing to recognise the font you are printing with

TML http://www.teachexcel.com/excel-help/excel-how-to.php...

Excel - Shows Bold but Wont Print Bold - I have a spreadsheet... - Free Excel Help Shows Bold but Wont Print Bold - I have a...

TEACHEXCEL.COM"

Another student shared his experience in an authentic context which provides a purpose and motivation for learning. An extract of what the student shared is as follows:

MBS (Table 4-15: Unit 13 - Lines 07 to 8, 10 to 11)

"Well as for me I was exposed to an environment that was far much beyond my abilities. The good thing is I learnt to adjust so that I could suit my new environment.

So in order to meet the set objectives I learnt to get out of office at around 8pm almost on a daily bases and continue with my work when I get home, get a short sleep starting around 12am only to work up again at 5 30 in the morning."

In this scenario the student worked with set objectives, in an environment that stretched beyond his abilities. This created a room for knowledge creation and production, which is one of the most important characteristics of an authentic context.

PPHS (Table4-15: Unit 13 - Lines 15 to 19)

"The kind of environment I'm at is an audit environment where the greater deal of work is done outside the work premises (that is at client being audited.... we also do IT audit). So when one encounters an IT related problem and it can't be fixed over the phone, they would have to come to the offices after hours or early in the morning. At first I could not handle the pressure as when laptops start coming they will be many, each user wanting his/her problem solved first. This would get to the extent that some will be angry with you that you are delaying processes. that pressure alone can confuse the crap out of you such that even something you know you will end up confused and everybody would be asking questions...."

Another student explains a context with difficult tasks and duties to execute as well as new problems that she had to learn from.

GCS (Table4-15: Unit 13 - Lines 38 to 40)

"The attachment programme is one of the greatest wealth of exposure, experience, opportunities and lesson on both business and social ever happened in my life. The programme is an eye opening machine in many areas, especially when assigned very difficult tasks and duties to execute. During the early days of my attachment I was scared to attend to user calls raised by the senior management and attend to new problems but with the time I was able to attend to any call."

Students found themselves in an environment where they had to make their own decisions in completing tasks. For example, a student explains how his preconceived ideas about industrial attachment was very different to what he later on experienced saying:

SMS (Table4-15: Unit 13 - Lines 55 to 56)

"...all along, I had the impression that the attachment period is all about being told what to do by the supervisors and simply following instructions. But in actual fact, some of the tasks that are assigned to me require referring back to notes I wrote during first and second year, reading tutorials online, downloading video lectures, etc, so as to work my way round the task., at the same time staying within the time period specified to complete the task."

This gives room for students to learn by actually solving a specific real world problem using theory learned in class. This also is similar to an experience shared by another student who talks of challenges met during industrial attachment.

MHS (Table4-15: Unit 13 - Line 62)

"The industrial attachment is going well but full of challenges especially when you don't know what is supposed to be done."

Another student shared an experience which draws on industrial attachment providing a conducive environment for hands on learning.

TMS (Table4-15: Unit 13 - Lines71 to 72, 77)

*"My attachment is well but during the first days it was hard to adjust to the environment since it is a busy environment. Here at ***** all the systems are managed by one ICT Department of which all the stations in the country are managed by this ICT department which is centralized in ***** so every day we work to ensure good ICT services are carried out which in fact result in task assigned to us.*

Technology is growing so as an ICT department we try by all means to engage ourselves to the latest and efficient systems which improve the day to day working basis of the organization."

The above extract depicts a dynamic industrial attachment environment. This seems to suggest that industrial attachment contexts that students are exposed to are ever-changing. Computer science students learn to change and are also changed by experiences they go through. A related practice portrays a context that is complex without being monotonous.

CMS (Table4-15: Unit 13 - Lines 80 to 81, 83 to 84)

"My attachment is going on well and it if full of ups and downs. The very good thing about it is that I am really exposed to what happens in the industry.

We wouldn't spend a day without opening a machine. The good thing about this is that now I know almost all the hardware parts and I can even identify them."

In another experience shared, computer science industrial attachment is a setting full of problems of different characteristics where a student must apply knowledge as well as create knowledge through solving specific tasks.

BNS(Table4-15:Unit 13 - Lines 93 to 94, Table4-17:Unit 15 - Line 06)

"My first task took me two weeks to work around and it involved installing a loan tracking MIS and learn how to use it. There are moments where I have to go back to my notes or teach myself staff using web tutorials.

The awesome thing about attachment is there is quite a huge room to just learn; watch how staff is done and then try doing it yourself."

Most of the experiences shared by these students show that these students were exposed to very different environments all of which had its specific authentic context. Solving a real-world problem in real, complex scenarios involve knowledge creation and application. Hands on practice ensure that students actually learn by solving new and real problems. Sharing experiences also meant they could set inspiration from each other to help them cope with dynamic and complex environments. A summary of this information is given in Table 4-3 below:

Table 4—3: Key Aspects of Authentic Environment

Type of contribution by student	**Characteristic of Authentic Environment from Literature Review**
Use of pictures to aid text explanation	Real world problems needing real solutions
Posting a practical Question based on real problem assigned to student	Dynamic environment which needed continuous research
Explanation of authentic tasks in relation to complexity of problem and time taken to complete job	Ill defined problem
Students explaining problems needing prior research in order to know how to solve them.	Knowledge creation and production
Tasks requiring a student to look at many options and make decisions along the way	Hands-on problems with different characteristics and non-routine in nature

4.3.3. Second Element: Authentic Tasks

Findings from the study comprise of instances during interaction on the Facebook group that demonstrate an authentic environment with authentic tasks. According to Herrington (2011) video on authentic tasks, of all authentic learning elements it's the task that matters the most. One student shared his experience of being exposed to tasks and activities that have real world relevance.

MBS (Table 4-15: Unit 13 - Line 09)

"The environment that I am in is characterised with multi tasking and the implementation of most of all the practical aspects of the things learnt at school so far."

Another student talks of day-to-day tasks assigned which ensure that ICT services carried out on a daily basis involved a lot to do with problem solving techniques. The post further put emphasis on the need for a student to produce knowledge rather than just relying on supervisor to give students step-by-step ways of going about the process of creating the final product that they make. The following is an extract of what this student shared.

TMS(Table4-15:Unit 13 - Lines 72 to 74)

*"Here at ***** all the systems are managed by one ICT Department of which all the stations in the country are managed by this ICT department which is centralized in ***** so every day we work to ensure good ICT services are carried out which in fact result in task assigned to us. Every week I am assigned a task which I am told to finish by the end of the day and at the same time I should not affect my day to day working basis at work because these tasks are regarded as a sidekick and also were I'm not understanding my supervisor encourage me to consult and ask without hesitation. There is encouragement of hardworking and research because they encourage us to research a lot that is if you are to face a challenge you do not quickly rush and consult your supervisor, you can research and find the nature of the problem and try and diagnose from there and in some way this improve your confidence in the section."*

Further analysis on posts took the researcher to an instance where a student shares an experience in which tasks were less complex but at times being difficult for a student to execute.

BNS(Table4-15:Unit 13 - Lines 88 to 93a)

"I wouldn't say my attachment environment was complex or simple, I would go for average. I have to confess I had difficulties coping. Most of the assignments or tasks I had to do on my own then present to my supervisor. I remember the other time he kept asking me for a long overdue template of the organisation's website which took me more than a month to complete. It took me long to complete some of the tasks but some which were web-based. I could not finish on time because of internet problems; either it was slow or there was no connection at all."

Personal reflections and realisations by students as they were working on different tasks assigned to them by their supervisors show how students talk about what they are doing and how they went about trying to solve problems at hand. The next extract shows how a student went about trying to solve a complex hardware problem.

SNS(Table 4-16: Unit 14 - Lines 01 to 02, 06 to 07, 14 to 15)
"SNS March 21Seen by 16
guys what might be the problem if a laptop shutdown and fails to boot again displaying blank screen caps lock and lights blinking
SNS March 24 at 10:24am •
yes PPHS
SNS March 25 at 2:17pm •
PPHS I heard you, so what's the solution in that situation. I bought another one and it failed.
TKS I tried that as well, it failed
SNS March 25 at 4:24pm •
ok thanks"

The extracts above show a task assigned to a student who shared with colleagues on the Facebook group requesting for assistance. Details from the shared experience in Table 4-16: Unit 14 show postings from participants of the group trying to help a colleague solve a task that is real and complex. Postings show an ongoing conversation with different dates and times when this student was still trying to solve a task over time. This is in line with authentic tasks explanation that in authentic learning a task would require production of knowledge over time, with students working on tasks for weeks rather than minutes or hours. Also the task is complex and ill defined, broad enough for students to actually have to make decisions about how they will be supposed to complete the task.

Similar experiences exist in Case 2, with one specific instance where a student shares two experiences where tasks could be assigned on one or more people in order to solve a problem.

TMS(Table 4-24: Unit 22 - Lines 34 to 37)

... on the network support side, the tasks would be mo individualistic but if the problem solving became difficult, more people would be assigned to the job... kinda like a 'meeting of minds' ... so that's where we'd experience the above mentioned situation. So usually, we'd trouble shoot using the usual general methodology on separate computers and do research on the internet where necessary, discuss possible routes we could take to solve the problem, and eliminate those that didn't work from our list of possible 'problem solving' methods"

TMS(Table 4-26: Unit 24 - Lines 22 to 24)

"Then we, as a team would go to the site with all the agreed upon materials to be used at the site, see the ICT guy who'd give us a 'tour' of the places we either needed to lay new networking infrastructure or repair. Then we'd need to decide, as a team, on the best way to go about the job with respect to issues such as the fact that we'd need to choose the shortest route coz the longer the Ethernet cable, whether it be ordinary network points or the backbone, the more prone to packet loss it would be, to a maximum of 100m..., and other "elementary" networking issues .... THEN WE WOULD WORK LIKE DONKIES ... "

Complex tasks which involved a lot of troubleshooting exercise are explained.

TMS(Table 4-26: Unit 24 - Lines 34 to 36)

*"When faults were reported, the first thing would be to check the routing in proxy, from the comfort of the office (*sigh) ... and if that proved fruitless, we'd drive to the client's premises where the problem would have been reported. The first thing we'd do there would be to check all the physical connections, and if nothing was wrong with that or rectifying a problem in the physical connection would not result in data packets flowing, we'd trouble shoot on the cmd or some networking specialised app till we found the problem. Technically expressed, we'd test the network from the lowest level of the 7 layer OSI networking model, going up the model till the problem was solved... thus the reason of starting with the physical connections and hardware, the physical layer... this was much more fun than "WORKING LIKE DONKEYS" with cabling... and though 1 problem could range from being solved in an hour, two weeks, I wasn't obligated to be there all the time so good for me ...*

Another student agreed to what the first student had said, explaining their personal experience that:

FHS(Table 4-24: Unit 22 - Line 39)

"Most of the jobs w used to solve them in pairs when I was working with the hardware technician my other colleague was in the systems section ,so we solved all the tasks that are related to systems and hardware ,"

In another instance, a student explains how they went about trying to solve tasks assigned and referring to notes and searching for solutions from the internet.

PDTS(Table 4-27: Unit 26 - Line 16 to 18)

"The task was complex, included creating email addresses as well and I did this all alone using my notes and well the hugest search engine Google. Can we ever live without Google? I doubt kkkkk."

Responses discussed around the authentic tasks element seem to suggest that during industrial attachment break, computer science students are exposed to tasks and activities that have real world relevance, require production of knowledge rather than simple reproduction of knowledge. These sometimes complex and ill-defined tasks could be and completed over a period which is not just seconds or minutes. The following table highlights the key elements explained around the authentic task element:

Table 4—4: Key Aspects on Authentic Task

Type of contribution by student	**Characteristic of Authentic Task from Literature Review**
Use of Facebook to connect with other students and share knowledge on tasks assigned at organisation	real world relevance
Multi-tasking	involving a lot of problem solving techniques
Explanation of authentic tasks in relation to complexity of problem and time taken to complete job	requiring production of knowledge
Students explaining problems which need effort from team members	Need for team work to solve a problem
Tasks that are solved over a long period, with a need to make decisions that have an impact on	Need to make decisions about how to complete the task

4.3.4. Third and fourth Element: Expert Performance, Multiple Perspectives

To answer the question on whether students relied on expert performance and or multiple perspectives during industrial attachment, I observed threads posted on the platform with interaction based on what students were experiencing. This suggests the need for a community where people in the same discipline can be able to create, share and use knowledge from hands-on experiences as well as learning from using examples of expert-application of knowledge to real-world problems.

In Case 1, one student shared an experience where at times they were assigned tasks that they had no idea of the solution. In this case the student would get help from the immediate supervisor as well as internet research.

BNS(Table 4-17: Unit 15 - Lines 07 to 10)

"Given a complex task and you have no idea how to go about it; the only thing I now know and will always do is ask where I do not understand and seek help when I'm stuck even if it means seeking help from our beloved Google. One time we had no wifi and there was only one modem (Africom) and I was tasked to find a way to make sure people can access the internet if they needed it. It's pretty simple if you have your Connectify or any other internet sharing software but that day I was very unlucky as I did not have all that. I did however learn that even without Connectify you can still share internet with just windows."

Another student said:

MBS(Table 4-13: Unit 11 - Line 08)

"More so I learnt to acknowledge what's in the next person whether senior or junior that I myself don't have and learnt to be humble enough so that I can benefit from whatever the next person has."

In this instance students acknowledge developing real life interpersonal skills which are as critical as knowledge of computer hardware, software, telecommunications and networking. In a different instance two students had difficulties in solving tasks assigned to them and used the platform of the Facebook Group to ask the other students how to solve the problem at hand. One student posted:

PPHS(Table 4-12:Unit 10 - Lines01 to 02)

"I have a question guys.... has anyone come across a problem whereby your excel document wont print bolded text as bold here, print preview window shows your document with bold but the hard copy doesn't come out in bold....anyone to help"

The other student posted:

SNS(Table 4-16:Unit 14 - Lines01 to 02)

"guys what might be the problem if a laptop shutdown and fails to boot again displaying bank screen caps lock and lights blinking"

Responses to the above mentioned posts show that group participants would assist in problem solving by sharing the knowledge they would have acquired from working on similar tasks. For both scenarios, it was interesting to note that on the platform there were instances where the group members collectively helped to solve a real task that a fellow student is working on. This also is in line with Herrington's response to expert performance not necessarily resting in an established expert but in access to learners in various levels of expertise. Herrington points out that

*"sometimes students learn best from someone whose knowledge is only a little bit more advanced than their own because often the true expert may have really forgotten the steps that they have taken to get to that point" (*Herrington (2011) Video on Expert Performance)

In Case 2, one student posted a new thread reflecting on how he experienced solving problems during industrial attachment saying:

VCS(Table 4-25:Unit 23 - Lines02 to 03)

"Mostly difficult tasks I had to do in union with my supervisor cause there was not much room in making mistakes on such missions. I only did as an individual the duties I had been trained on and those with solutions that could be easily looked over on the internet."

The researcher posted a question on the Facebook groups.

TML(Table 4-26:Unit 24 Lines 02 to04)

"Reflecting on your practical during industrial attachment, can you discuss how you went about solving the complex problems you were assigned to, How you have improved in delivering quality service the next time you were assigned a similar task. You can use examples of the actual tasks you were assigned."

Students' responses are analysed below.

PDTS(Table 4-28:Unit 26 - Lines08 to 09, 16)

"What I usually did my pen and notebook were my best friends, all I learnt and what I did with my supervisor I would write down in my book in detail step by step.

The task was complex, included creating email addresses as well and I did this all alone using my notes and well the hugest search engine Google. "

This response implies that this student would record steps of how tasks would be executed learning from the expert who is the immediate supervisor in this case. The next time the student would be assigned a similar problem, they would refer to their notes and also refer to a variety of sources via a search engine online. This is similar to another response which stated:

PDTS(Table 4-29:Unit 27 - Lines05 to 06, 09, 13)

"My personal experience, help mostly came from the supervisors during the first month, going with me to attend common problems and show me how to rectify them.

And Google came to my rescue so many times I solved many problems using google

at one point I called VCS asking where the network card was on a computer because I knew VCS is well versed with hardware and I solved that problem over the phone with him."

What is different in this specific response is that this student shares how their learning environment provided access to other learners at various stages of expert performance. Another student shared on the length of time granted to complete a task as well as progress.

MMS(Table 4-28:Unit 26 - Line 22)

"If the problem had a possibility of hindering progress, I got the readily available help from them so that I could retrieve progress in time."

An additional characteristic of multiple perspectives and expert performance is when a student watched online videos of a task they wanted to complete. This was done in order to learn from actual work being done, then apply the knowledge gathered from this to solve a specific problem. This student also shared a story about their

professional practice and the stages of help available to them depending on the level of difficulty of a task.

VCS(Table 4-29:Unit 27 - Lines 19 to 22)

" Practical exposure on watching demonstrations of how some problems had to be resolved through my supervisors helped at lot. When I had challenges usually I visited mostly you tube because I understand better from watching, at times text tutorials and if no positive outcome I would escalate the issue to my supervisor for assistance."

The above extract may imply how students learn effectively in different ways. This means that there is no one way in which learning should happen as learners have got their different ways in conceptualizing and solving problems. In another instance, a student explains how she would get help from the subject expert. This student argued that she would get network related help from the network expert who was the network engineer in this case. Friends and students in higher stages of expertise were also sources of help.

FHS(Table 4-29:Unit 27 - Lines 24 to 26, 28 to 29)

"I learned thru asking my supervisor in the early months but as time went by, I used Google. If the problem seems to be hard, I would call an expert in the area, for example for a network problem, I would call the network engineer and he would tell me what to do over the phone.

*I also learned thru asking colleagues online and face-to-face in meetings that we used to hold and asking former attachees who were working @ *****"*

Learning by practice with an expert is another theme which stood out in these instances of authentic elements. As well, this student got access to the way an expert could think and act and apply knowledge whilst solving a real problem. Dialogue with the expert helped the student get an understanding of what is done, how it was done and why it was done in that way.

TMS(Table 4-29:Unit 27 - Lines 31 to 34)

"through osmosis, by learning whilst applying in a real life situation...
through use of simulation software...
GOOGLE that is the internet,
LOL... and also through oral exchange. "

One last student reflects on the complexity of a task, available time allocated per task as the major factors that affected the method they would employ to solve the problem at hand.

MMS(Table 4-29:Unit 27 - Lines 38 to 43)

""Experience is the best teacher", they say.

To learn what I now know through attachment I could use any form of strategy to get the knowledge, I could ask, try, research depending on the complexity of the problem. Where there was time I could try to solve from my own knowledge with the help of mother Google. If complex I could ask and since there was time they could try to solve the problem to perfection. If there was no time I could find the nearest person who could help so that the problem could be rectified easily especially when it is a shore stopper."

Expert performance and multiple perspectives are seen to co-exist during the industrial attachment break. Postings from students bunched these two elements in one. Whilst a student was exposed to an environment that provides access to the way an expert would think and act when solving real problems. The same or similar scenarios allowed different perspectives to be examined by students from many different points of view.

Table 4—5: Key Aspects on Multiple perspectives and Expert Performance

Type of contribution by student	**Characteristic of Authentic Task from Literature Review**
Student actually worked on specific problems with time frames	hands-on experiences
Students worked on tasks together with supervisors or team members	expert-application
Students helped each other from experience gained	knowledge to real-world problems
Students explaining problems which need effort from team members	Internet a resource for how-to's, videos and notes
At times students had to refer back to the theoretical courses to solutions for a task being worked on	Referring to class notes
Students negotiate with other team members	Develop interpersonal skills

4.3.5. Fifth Element: Collaboration

Collaboration is yet another element that was highly significant during the industrial attachment break. The learning environment provided both joint problem solving experiences and social support. For example one student talked about how each member of the team's effort would be needed in order to complete a task.

MBS(Table 4-13:Unit 11 - Lines 06 to 10)

"In my case since we use the Scrum approach to software development, there is hardly anything that you can do without considering your team. In life we all have differences but if we want to achieve results we should put aside all our differences yield results and move on to the next step. More so I learnt to acknowledge what's in the next person whether senior or junior that I myself don't have and learnt to be humble enough so that I can benefit from whatever the next person has. One last thing if you contribute to the team, the team will also contribute to you. Don't be selfish with what you have because in most cases the next person might be having a better, more efficient way of doing the things that you are being selfish with."

This student, in his comment, helped reveal the need for people to collaborate is problem solving. He specifically highlights how every team member is important in coming up with the overall solution of the problem and how it is important for collaborators to be goal-oriented. Another student, explains strength and weaknesses being used as a base for allocating tasks in a team.

MMS(Table 4-13:Unit 11 - Lines 12 to 14)

"Team work is the best way to get objectives achieved in time.

I have noticed that in a team we have to identify team member strengths and weaknesses and base on them on allocating tasks. This helped us to get the job done in time rather than allocating tasks to resources that are not competent. From my experience, team work in most cases work well though there are some individuals who won't deliver in time. Many strategies can be employed to get such individuals work. By the time I had to lead a team, I could push those I was close to and those who I can convince to work so that at update meetings it's easier to say most of the team is done but we are still waiting for such individual. This could automatically push the individuals to work in time."

In another instance, a student explains problems that they were assigned, that involved team members from different departments who had to each make an input from their area of expertise in order to solve a problem. This student specifically pointed out

their contribution being of significance to the final product. Also of importance is when the student highlights the need for team members to take turns in contributing to the solution of the problem as well as giving each other a fair chance to contribute.

PPHS(Table 4-13:Unit 11 - Lines 20 to 25)

"well in my case its almost 50-50 but for those tasks that we undertook as a team, I learnt quite a couple of things. Things like the need to respect other colleagues' views and opinions, not look down upon others coz you never know where and how the brilliant ideas will come about. Once you do that, chances are you will give a blind eye to suggestions that might be befitting to your situation. I got to work with the guys from the graphic design dept prior the launch of a new whistle blower programme and my role was to assist with the technical aspects to design the flyers, brochures and a slideshow. It was quite fascinating to discover that you'd see some of your contributions making it to the final piece and also how someone can come up with some good point(something you'd notice you could not have thought of).....but all being said, the key to a successful team are open channels of communication. You need to convey your ideas, it's not like it's an assignment in which you can pass alone or something. "proper communication channels are very crucial" , I learnt."

From this post, communication is argued to be one of the important facets of team problem solving. Also of importance is when the student highlights the need for team members to take turns in contributing to the solution of the problem as well as giving each other a fair chance to contribute. The Facebook group helped in this regard in that it motivated students to do something and be able to share.

In Case 2, one student shared his experience where he worked together with a supervisor to complete a task. Spending many hours together with a supervisor helped this student work hard whist being motivated by each other's input. This helped create a team working relationship and faster job completion.

TZS(Table 4-24:Unit 22 - Lines 19 to 24)

"I will never forget a task that my supervisor and I worked on as a team. The job was of converting stock codes of the whole database to a new format. They were around 10 000 codes which we had to convert one by one. Within a weekend that is from Friday to Sunday, working from around 8am to 10 pm. Due to hard work and motivation from each other we managed to complete the job nicely. From that our relationship grow significantly."

Another experience shared shows the need for physical and mental input from team members as well as academic or field experience for a job to be completed.

TMS(Table 4-24:Unit 22 - Lines 26 to 28, 32)

"Well, every task assigned to us, as a group of "obedient worker ants" always needed team work, as the quoted phrase implies. On the cabling side of it, every1 of us had some sort of physical and mental input in the work being done regardless of academic or field experience as required 'real time processing' and 'execution' once the job begun... So regardless of the apparent or less apparent evidence of difficulty pertaining to a job, team work was indispensible in that instance, and a job which could seem difficult on the surface could be very easy and vice versa.

and lots of jokes and 'healthy' rivalries were experienced mind you ..."

Line 22 of the post highlights certain incidents were social support as well as differing minds in executing team tasks is evident. This is an important characteristic apparent in real world working environments.

Another case similar to what one student shared in Case 1 is seen in Case 2 where a student shared about people with strengths in different things combined to solve a task that needs different expertise.

FHS(Table 4-24:Unit 22 - Line 39)

"Most of the jobs w used to solve them in pairs when I was working with the hardware technician my other colleague was in the systems section ,so we solved all the tasks that are related to systems and hardware ,"

Learning is suggested to exist during team problem solving as one learns from another person's input. Another element highlighted here is an element of perseverance when working on a problem. This student explains how they were motivated to solve a problem when working as a team as compared to when working alone in which case one would easily give up when working alone.

PDTS(Table 4-24:Unit 22 - Line 42, 48)

"Team work was awesome it really helped in coming out of ideas and handling a problem easier we delegated each other a task then if one could not solve it we would ask our supervisor for a solution if we could not solve it alone.

I would say in most cases team work was better because you learn from your other mates as well as the supervisors if you do something alone one can tend to give up but as a team one would suggest what if we do this and it will work so it eased the burdens for us."

Experiences shared and classified under the collaboration theme showed tasks which needed team effort to be completed. This shows the need for team members to come together and determined to find the solution for the problem at hand. As well, for a team to work together effectively required good communication skills, and also the ability to resolve conflicts that may come up whilst working on a problem. It was also key for team members to be able to listen to fellow team members and give each other room to suggest best ways of problem solving. Knowledge production and sharing is greatly evident in this element of authentic learning.

Table 4—6: Key Aspects on Collaboration

Type of contribution by student	**Characteristic of Authentic Task from Literature Review**
Some tasks could not be completed by one person as there were incidences needing experts from different fields	joint problem solving experiences
Used the Facebook platform to share experiences as well as get valuable input on specific tasks	social support
The need for people at different levels of expertise	Team work
Students had to learn how to make formal requests to other team members.	Improved communication skills
In order for tasks needing joint effort to be completed, students had to learn how to handle conflicts	Conflict resolution
When students worked in a team there was need for good listening skills and role playing as well as having team leaders	Ability to listen

4.3.6. Sixth Element: Reflection

The reflection element of authentic learning during industrial attachment was investigated in ways more than one. The first, simple way of reflection is the course CS300 requirement for a student to write two reports of what they experienced during industrial attachment break. Dialogue of what the students experienced was shared on the Facebook groups. Questions sparking dialogue with students to share their experiences during industrial attachment was another effective form of reflection by the students. These students mainly reported two forms of reflection that is reflection in action and reflection on action. The students reports authored during the period of industrial attachment reflected how they applied and created knowledge during industrial attachment.

The researcher posted a question on the two Facebook groups in order to find out how the students reflected on their experiences through report writing. Questions posted are as follows:

TML(Table 4-18:Unit 16 - Lines 02, 04)
"How did you find the process of writing your first report during attachment?
What kind of strategy did you use to remember what you did in your writing?
Are there any changes that you will implement in writing your second report?"

Most responses show that students would keep a log of activities in some form of diary or logbook then extract from these when writing the report. The following responses were posted on the platform:

MBS(Table 4-18:Unit 16 - Line 10)
"My logbook was my main source of information, that is it is very useful to log things in your logbook as they happen."

The student kept a record (reflection-in-action) of activities done in a personal logbook. From these, a final report with what was done and lessons learnt was created (reflection-on-action). Some students kept notes of accomplished tasks, challenges, suggestions and lessons learnt.

DZS(Table 4-18:Unit 16 - Lines 14 to 15)

"Used to have a pocket diary which I used to jot down accomplished tasks and some few challenges I met, but always should learn to manage your time wisely that is at each week ending should compile all the concepts, problems and solutions you met. On my own suggestions in order to have a better report one should have to schedule a timetable were you compile challenges, tasks accomplished and suggestions for improvements you made."

SNS(Table 4-18:Unit 16 - Lines 25 to 26)

"Writing my first report was not difficult for me because each and every task I wrote on my diary book and also my logbook. This makes it easy to write my first report because of my two sources log and diary book."

Rather than jotting notes with pen and paper, one student kept a digital record which made it easier to transform these notes to a full report. Some students proved to me more digitally included in their coping strategies.

BNS(Table 4-18:Unit 16 - Lines 21 to 22)

"Kept a diary and a logbook(soft copy) which I used to record work activities, challenges and lessons learnt. Even with all these tools available it took me quite a while to come up with something solid."

Another case consisted of an organisation document management systems. This fulfilled both requirements from the organisation and also helped the student to create the university report.

PPHS(Table 4-18:Unit 16 - Lines 34b to 36)

"in my case we have what we call the Great soft Practice Management System (web-based). Every employee have an account and you log your daily activities there which will later be reviewed by your superiors. You can actually extract information from there."

Case study 2 provided similar ways in which students recorded and reflected on industrial attachment experiences. Apart from sharing on keeping a day to day log, weekly log and digital copy of event logs, students in Case 2 were provided with an additional question to reflect on how they presented their attachment experience to the computer science department. One student shared how she summarised her two reports in order to create a PowerPoint presentation on experiences.

FHS(Table 4-22:Unit 20 - Lines 10 to 11)

"on presentations I just summarised my 2 reports and make a good presentation but I didn't have any idea of what to include in the ppt presentation, I was lucky during presentations because I put all the information I knew... so when it came to questions time I just replied with a smiling face showing my knowledge about the things I said."

Another student shared how the practical experience helped them come up with the final presentation. This student highlighted how practical attachment experiences helped in defending their presentation.

PDTS(Table 4-22:Unit 20 - Lines 19 to 20)

"I had no idea how to come up with one so I had to look for the past attachment presentations of others and copy format. on the day to present it was so frightening all the lecturers were there but fortunately I knew what I had done so it was easy and went through it easily

In another instance, a student explained how cooperation with other students in their stream, other senior students as well as academic supervisors were instrumental in presenting their experience.

VCS(Table 4-22:Unit 20 - Lines 22 to 25)

"The challenge was on how logbook and final presentation was to be structured. Fortunately we held meetings as a class and shared ideas on how to go about it ,since some had communications with senior students and lecturers who were supportive to us This helped me a lot and gave me confidence in my writing and presentations . I will be forever grateful to the cooperation we had as a class and would urge other students to do so."

Routine tasks have also been suggested to be part of industrial attachment experience. The student further explained how they came up with a strategy of updating their report with new things learnt whilst other activities were recorded as routine. Questions from the academic panel during the presentations also helped the student reflect more on their experiences.

MMS(Table 4-22:Unit 20 - Lines 39 to 47)

Writing my report has not been a problem since I have kept a compact logbook of my day to day activities including some backup copies of whichever material I used on certain tasks that I was assigned to. Some of the task are done on a day to day basis and those I could not record in

my logbook and treated them as routine tasks. The first report was the most taxing to write since it was doing a new thing. The second report was a continuation but detailed since the light was shed buy the writing of the first attachment. Strategy: I came up with an idea of updating my logbook every Friday unless I did something very new and interesting midweek that's when I could get to update it mid week. I had also to update my report every four weeks though sometimes I could not stick to that. For the presentation I was Ok with the panel since most of the faces I knew them. My biggest problem was a lot of staff in my slides which gave the panel ideas to come up with more questions for me. Luckily I had ideas about what I included in the slides so I could defend myself.

The last part of reflection in this study was in keeping with the Facebook group itself. As students posted different information that is, asking questions about how to perform certain tasks, updating colleagues on what they are doing, sharing advice and experiences. The two Facebook groups provided a learning environment where students kept online journals/diaries that reflected their thoughts, discussions as well as choices made in solving real world problems during industrial attachment.

Table 4—7: Responses on Reflection

Type of contribution by student	Characteristic of Authentic Task from Literature Review
As students were working on specific tasks assigned by their industrial supervisors they used the Facebook platform to share their experiences as they worked on the tasks	Reflection in action
Students referred to their experiences when responding to other peers' questions as well as responding to how they wrote their industrial attachment report	Reflection on action
Students kept diaries for references when working on tasks	Note taking and daily log

4.3.7. Seventh Element: Articulation

Public defence of what the students experienced (knowledge gained and lessons learnt) during industrial attachment showed articulation. The posts discussed in the previous element (Reflection) show that students could articulate on activities done

during their final face-to-face presentation. Students explained the role they played as a way of defending their growing and glowing experiences from the industrial attachment programme. In the Facebook group, students shared their post attachment review and shared experiences on how they prepared for their final presentations.

Another source of information to find out the extent to which authentic learning exists during industrial attachment was an observation on the interaction and knowledge sharing on the two Facebook groups. Here students' post were analyzed in order to find out the content about their learning environment and how they wrote about the learning environment they were exposed to. For example one student in Case 1 asked about how to solve a problem with a laptop which was failing to boot. Other students tried to help by articulation on their experiences. This showed how their understanding of hardware concepts was growing by doing practical. (Full details of post on Table 4-16: Unit 14)

SNS March 21Seen by 16

guys what might be the problem if a laptop shutdown and fails to boot again displaying bank screen caps lock and lights blinking

PPHS March 24 at 9:32am ·

just a blank screen and no message displayed?

SNS March 24 at 10:24am ·

yes PPHS

PPHS March 24 at 4:37pm · Like · 1

If it keeps showing black its most probably RAM, how big is your RAM and OS are you running?..... One thing I've noted with RAM especially for laptops is it can work on one machine and fail on another depending with the specifications.

TKS March 25 at 8:52am · Like · 1

Correct, remove RAM and reinstall it, if the problem persist connect an external monitor. If it still fails, the problem could be VGA

The following table summarises the key aspects of articulation found in this study:

Table 4—8: Key aspects on Articulation

Type of contribution by student	Characteristic of Authentic Task from Literature Review
A platform used by students to explain how they achieved the goals of the industrial attachment	Face to face presentation
Students discussed on the Facebook platform how they solved real problems	Articulation on facebook

4.3.8. Eighth Element: Coaching and Scaffolding

Rather than providing exact answers to the student, the researcher provided just links to sources that the students could read from and try to solve assigned tasks on their own. For example, in Case 1 scenario described above, where a student was asking for help in solving a hardware problem, the researcher provided a link to the student to help them look for the solution on their own.

TML(Table 5-14:Unit 14 - Lines 18 to 21)

"http://h30434.www3.hp.com/.../blinking.../td-p/1237727

blinking nums lock/ caps lock -blank screen- - HP Support Forum - 1237727

1) Windows 7 2) Laptop Screen blank-external video..."

Some students also played the role of a more knowledgeable other in trying to help their colleague.

BNS(Table 5-14:Unit 14 - Lines 40 to 46)

"you just take note of the brand name and model then visit the troubleshooting pages available from the brand website and go through the step by step troubleshooting notes available. They don't always work but they do give you an idea of what's really going on. A good example is this page ye HP ------http://h10025.www1.hp.com/ewfrf/wc/document?cc=us&lc=en...

Blank Screen LED Error Codes | HP® SupportDetails the types of LED blink codes that may occur in...h10025.www1.hp.com"

Conversations on Table 5-14(extract on previous section) show how a student scaffold, and get coached by more knowledgeable others in coming up with a solution to the problem being faced. The following shows an extract of the ongoing conversations:

Table 4—9: Responses on Coaching and Scaffolding

Type of contribution by student	Characteristic of Authentic Task from Literature Review
Mainly done by facilitator to help students develop ways of solving problems by researching solutions thereby producing and applying knowledge	Sharing links to online resources
Students discussed solutions to problems with each other as they tried to solve the problems	Students providing feedback

4.3.9. Ninth Element: Authentic Assessment

Authentic assessment in one element that was done during industrial attachment break. Academic supervisors visited students twice during this period to talk to their work supervisors. Work supervisors were given a rubric which they used to assess the students' progress during industrial attachment. See Appendix C for a sample rubric.

4.4. Students' Perceptions of the Computer Science Programme

Based on the experiences of the industrial attachment programmes, students shared their perceptions on how they think the computer science curriculum could be transformed in order to suit the needs of the learner. Students raised very interesting points in this section which help answer one of the objectives of the study which ought to include proffering suggestions for keeping the programme robust. A question was posted on both Developers and Attachment experiences Facebook groups to find out students' perceptions of the industrial attachment programme.

TML(Table 4-20:Unit 18 - Line 02)

"What is it that you think if improved (from both the organisation attached at and the Computer Science Department) would have made your attachment experience achieve the set objectives?"

In Case 1, students highlighted a number of issues requiring improvement that they faced during industrial attachment. For example, one student argued of inadequate computer science training facilities in organisations that recruit students for industrial attachment stating:

MMS(Table 4-20:Unit 18 - Lines 05 to 07)

"I think from the organizations if they move away from taking interns to fill gaps in the organizations or vacant posts and let they have a planned schedule for interns to ensure that the interns are exposed to all the available areas of expertise in the particular organization. You can find that a certain intern may be given an office which is vacant and that office has a backlog since no one was doing the work, it might be data capturing or updating records in most cases. That student is now spending the whole year firefighting for the organization but not getting adequate expected experience and won't achieve the set objectives."

This shared observation, shows a dark side of industrial attachment experience which some students are exposed to. In the light of this experience it has been shown that certain organisations seem to engage students in the name of industrial attachment but in actual fact with an intension to fill in job vacancies. This problem may be caused by the general lack of qualified and skilled personnel to fill in these positions as explained earlier in section 1.1.1 and section 1.1.2. The other reason could be that generally it is cheaper for an organisation to hire students in that organisation expenses on salaries are reduced. Perhaps the college could use its liaison offices to lobby organisations to observe some ethics in the way they handle their attachment programmes.

Similar to this is what another student had to say, however suggesting the need for the university departments to be involved from the very first stage of helping students to get placed at relevant departments in organisations.

BNS(Table 4-20:Unit 18 - Lines 16 to 18)

"Firstly I really feel our department has to be in a position to make sure their students get attached to organisations that at least offer their students the required experience, where they

can at least achieve above half the set objectives. I wouldn't expect a Comp Science student to sit around in an office without a computer and internet! The department should be aware and be able to recommend which organisations are capable of providing the required experience for, not just any student but a computer science student."

In other instances students cited the shortage of usage of up-to-date technology as well as limited hands-on practice in the current degree programme and suggested the university as the place for new innovations and research.

MMS(Table 4-20:Unit 18 - Lines 06 to 14)

"From the department if they can try to use modern technology that is the environment from which we are learning is actually different from what is in the industry. When going into the industry it then seems as if everything becomes new and you have to learn all new. I was introduced to a number of tools that I have never head of at the university but these tools to my surprise are day to day tools in the industry. This actually limits our innovation. I believe innovation should come from university research. If I could have been introduced to such tools at college by attachment period I could have achieved my objective of coming up with an idea and implementing it but the attachment period passed when I was still in the learning curve for the tools. I might say let them improve the practical part in the university and not wait only for attaching organizations to provide the practical experience. Some organizations may not provide the desired practical experiences."

MBS(Table 4-20:Unit 18 - Lines 25, 28 to 29)

"I think the Computer Science Department should be more practical oriented, because computer science is more like an art and yes the theory is very much vital but it needs to be accompanied by a strong practical backup.

The other issue is technology is not going backwards so the department should make sure that the latest developments in technology are implemented. One last issue is we are a computer science department hence the way we do everything should be technological, that is let the students create systems that the department will use as a way of encouraging the spirit of research and development research in our students as well as boosting their moral."

Another student highlighted the need for a relationship to be created between hosting organisation and the computer science department. This helps the university assess the working environment that a student will be exposed to, in order to ascertain if it will help the student fulfill the set objectives.

PPHS(Table 4-20:Unit 18 - Lines 47 to 51)

"I really feel our lecturers should sort of arrange a meeting with our supervisors once a student gets attached. I know they are written objectives and expectations but I also feel there has to be a closer r/shp between the two parties. Also to assess the working environment, for example: 1st two months I was at this company, we were 5 interns from IT at an organisation equally big with the one I'm at now (where am the only intern). You'd find that the productivity of the attachment will be compromised, worse still if you're someone who is not forthcoming. There is certain staff that you will spend the rest of attachment not knowing just because they feel you are still an amateur, you get sidelined in participating in such tasks yet that's the feel of industry we're looking for.

This was agreed to by a student who said:

"Yes I agree with you PPHS because at first it's hard to adjust to the new working environment."

Case 2 was full of similar sentiments. First, students suggest deliberate efforts to be made by the faculty and department in assessing possible organisations where students are to be attached.

PDTS(Table 4-23:Unit 21 - Lines 05, 09 to 10)

"Personally I think if the department helped us in looking for attachment places it would be easier for us because some got attachment places later which means learning time at the organization is shorter as well.

I also think if the department would arrange a few workshops for us prior attachment so that we have some hands on experience because theory is too much but practical we lack so that would help us. It will help us not to be shy at work."

The above contribution seems to suggest the need for a departmentalised liaison officer rather than having one university-side office which deals with placement of students on attachment. This may be so considering that this one office may have problems in attending to the many students from different departments seeking placements per time. Also, having a department liaison representative will also help in that placements can they be sort and researched on by the experts in the required field.

VCS(Table 4-23:Unit 21 - Line 12)

"University should hold a meeting with the company before student starts to provide the attachment expectations and if the company cannot support then the student can be assisted in finding another place also with some recommendation from that company."

FHS(Table 4-23:Unit 21 - Line 14)

"The computer science attachment coordinator should source out good companies that offer the specific objectives so that we can gain more relevant experiences because some of the companies their IT sections are small and they do not allow students to enter in to server rooms , to access their databases ,to fix computers because they have the tendency that students have no prior knowledge on this ,if they face challenges with fixing computers they outsource services, so this leads to attachees not gaining enough experiences."

The above posts seem to suggest the need to redefine the role of the computer science coordinator. One student shared an experience where some of the things that they expected to learn were available at the organisation that she was attached but restricted for students on industrial attachment.

PDTS(Table 4-23:Unit 21 - Lines 06 to 07)

"The other thing is at the two organizations I was at, attachees are restricted to the most vital parts of IT department which is what we should learn like the server rooms were out of bound to students as well as we did not have access to databases and above all there was no programming done which means areas of exposure already were now few"

In light of these experiences shared, it has been seen that although authentic learning exists in industrial attachment, there seem to be other concerns which need to be addressed in order to have this programme meet its objectives. Aside from just focusing on having students attached at organisations, curriculum has to be complemented by actions that make it possible to attain the desired result. Given the dynamic nature of the ICTs, even the “desired result” may regularly need to be reviewed in order to re-focus, should there be need.

4.5. Chapter Summary

In an effort to answer the research questions resulting from the problems highlighted in the first chapter of the study, data collected from the Facebook interaction is thoroughly analyzed. A comprehensive discussion of Facebook postings is presented. These postings were analyzed using CA an, mapped on the nine authentic learning framework by Herrington et al. (2010). The results of the study presented paves way for the researcher to make a conclusion and recommendations, both detailed in the next chapter.

Chapter 5: Conclusion and Recommendations

5.1. Introduction

In this chapter, I present a review of the findings in relation to the research questions underpinning this study. The theoretical framework, authentic learning, forms a basis for which the findings presented are summarized. Following this, I provide a brief discussion of the limitations of the study, zeroing in on the context justification in which this study was conducted. I then sum up the thesis by explaining the conclusion of the study based on the results discussed. Recommendations and areas for further research are outlined and as well to mark the end of the dissertation.

5.2. Review of research questions

The research findings have been summarised according to the three research questions that underpin this study. Further to this, findings highlighted students' perceptions of the industrial attachment experience in relation to the computer science programme.

5.2.1. Reviewing the nine elements of Authentic Learning

By answering questions framed from some of the authentic learning elements by Herington et al. (2010) and observing interaction and knowledge sharing among the two case studies in this research, the researcher managed to find out how authentic learning happens during industrial attachment break.

To start with, findings show that authentic learning happens during industrial attachment as the student gets access to an authentic context (see section 4.3.2.), and solving real world problems (see section 4.3.3.). Facebook interactions with students indicated that the industrial attachment break provides a physical environment that reflects the exact way knowledge will be used in real life.

Secondly, during industrial attachment, a student works on real problems under the mentorship of an expert that is immediate organisation supervisor where the student is attached (see section 4.3.4.). This industrial attachment provides a space where ideas can be explored at length in the context of real situations under the mentorship of experts in the field. Students also get access to multiple perspectives by use of online resources, where they connect with peers, access learning materials including how-to videos, published books and journals (see section 4.3.4.).

Interaction on the Facebook groups show that students are assigned to complex and ill-defined tasks which are broad enough for students to actually have to make decisions on how to complete assigned tasks as expected. Availability of wide learning resources aid the student in solving these real problems. These include:

- Theoretical knowledge gained from the first two years of learning different computer science courses at the university,
- Online material from different search engines e.g. Google (has been unanimously agreed on as the most used search engine by the participants of this research), YouTube videos, Online Books and Tutorials.
- Simulations of tried and tested programmes which aid in problem solving.
- Experts in the field of computer science e.g. immediate supervisor who can be a systems administrator, networks engineer of software developer.
- Students and colleagues who are at higher levels of expertise.
- Academic supervisors connected with students through social media.

Students also learn a lot from solving problems in teams (see section 4.3.5.), where people are assigned tasks according to areas of strengths. This setting, however, required excellent communication skills in order to create and build a shared understanding of the processes undertaken to solve the tasks addressed to groups.

The experiences shared on the two Facebook groups as well as attachment reports written by the students provide a way for students to reflect on choices they made in creating products. These also report on lessons learnt and a provision of recommendations on areas that need improvements in future (see sections 4.3.6.-4.3.7.). The element of collaboration was seen as a useful vehicle for most elements of authentic learning.

On coaching and scaffolding (see sections 4.3.8.), postings made on the two groups' discussions show how students helped each other tackle problems assigned to them. Students also shared how they learnt in teams and from the mentorship of supervisors that they were working with. There were instances where the supervisor pointed students to resources that these students would need to use and work out the solutions to problems on their own rather than just provide specific answers. These enabled students to create and apply knowledge as well as learn by trying out their own solutions to problems. Learning by doing is seen to be one of the necessary experiences for the computer science discipline.

Lastly, the element of authentic assessment had strongly been covered in the current assessment method by way of visiting students when their on-site. This element is also covered by having an industrial supervisor assess the student by way of filling in a rubric from the university. The authentic assessment element may need to be further investigated in having students talk about their perceptions of the attachment assessment practice.

5.2.1.1 How does authentic learning happen during industrial attachment?

In authentic learning, a student can be exposed to a replica of an authentic environment. This has been witnessed in the computer science industrial attachment programme. Although most of the authentic learning elements by Herrington et al. (2010) have been seen to relate much with what happens during industrial attachment, this study has helped unveil some of the pressing issues of the programme segment. These issues are not necessarily authentic learning elements but have a bearing on the overall experience of industrial attachment.

In industrial attachment, a student is exposed to the industry needs, by so doing receives the necessary training the industry needs (see section 4.3.). The difference, however, is that during industrial attachment students are working on actual products used in industry. Real problems, goals and achievements exist during the industrial attachment break which is not necessarily the case in authentic learning.

5.2.2. In what ways can knowledge sharing and or authentic learning be fostered using social media among geographically distributed learners?

Results of this study show that students need a lot of timely and consistent support both from the computer science department and organisations which they are attached and motivation during the industrial attachment period in order to achieve the set objectives as well as find worth of the computer science degree programme fulfillment. The Facebook groups created became mediation tools for interaction, knowledge and information sharing for students when they are geographically distributed during the industrial attachment break. This means that curriculum with a practical approach and in which students and experts/supervisors may be geographically distributed have ways in which they can embrace social media in order to effectively share knowledge and interact.

To better foster authentic learning during industrial attachment, students should be mentored by experts in the computer science field (see section 4.3.4.). Working on and solving real problems with supervisors provides motivation for students to create and apply knowledge during industrial attachment as well as gain the expertise required in industry (see section 1.1.1.).

Providing access to hands on problem solving allows students to try and test theoretical knowledge attained during the first two years of the academic programme (see section 4.3.2. and 4.3.3.) with real problems or situations. This improves confidence when student apply their knowledge to the real world. Students begin to find relevance in what they are learning and it further motivates them. In cases where students are not able to work on live systems, providing simulations of real scenarios will help students learn and grow their understanding of real life settings (see section 4.4.).

5.2.3. What are the students' perceptions of using social media to enhance their authentic learning experience during the industrial attachment programme?

In this study, students shared their perceptions of the industrial attachment programme They unravelled their expectations, areas they loved, challenges faced and recommendations to both the university and the organisation they were attached. The dynamic and growing nature of ICTs compels the need for communication and interpersonal skills- both for students as well as people they work with. Therefore, the computer science programme need to adequately equip and psyche students for real-world working environments. These can be complex, exasperating and overwhelming. Therefore, students need to be prepared adequately prior to their industrial attachment. The results show that team building, networking and conflict resolution skills are elements that need to be factored in some modules.

5.3. Limitations of the study

The study was limited to students from Computer Science department who had registered for the CS300 Industrial Attachment year between the period 2012 to 2014. Future studies can expand the samples to the other departments of the same and other universities. Students were registered for the Bachelor of Science (Honours) in Computer Science programme with Bindura University in Zimbabwe.

As computer science department is a member of the Faculty of Science at Bindura University, its programme Bachelor of Science Honours in Computer Science is guided by the degree regulations read in conjunction with the general university regulations. For industrial attachment the general industrial attachment guidelines (see Appendix C.1.) apply when students commence their third year of study and look for placement at different organisations. Assessment of endeavours during this period are based on the prepared assessment instruments from the respective faculty and department.

Organisations where students are attached/ find attachment have their own policies in place. The guidelines from the university are availed to these organisations

but these do not dictate the way industrial attachment is done, they only work as desired guides.

Finally, students who participated in this study had different ways and levels of access to the internet. Issues to do with internet speed, cost and time to access affected the way students participated on the Facebook groups. In other instances, Facebook access during working hours was not allowed, which had a negative impact on how students participated. As well, company policies (both on the organisation side and on the university) may not allow use of social media in both education and research. This means that at times student had to participate using personal resources and as well during their private time.

The two groups that participated were requested to sign an informed consent letter (see Appendix C.5.). Some students managed to communicate with company officials about the study whereas others chose to do it during their spare time to avoid victimisation and being prejudiced.

5.4. Conclusion

The study presents an argument and position that Facebook groups are among social media technology tools that can be employed to enhance knowledge sharing through interaction. Facebook has been effectively applied to understand students' experiences during industrial attachment. It has also been used as a tool that effectively facilitated interaction and knowledge sharing among students exposed in different real world environments. Conversation analysis analytical framework can be effectively applied to investigate talk-in-interaction which is in the form of media shared on an asynchronous discussion forum.

It is encouraging to note that most of the authentic learning elements by Herrington et al. (2010) exist to a greater extent in the industrial attachment break for the honours degree in computer science programme. While some elements seem to exist to a greater extent from observing a high traction of postings by students on these specific elements, other elements seemed to have fewer postings that could be analyzed. The

elements which seem to exist to a greater extent were authentic context and task, expert performance multiple perspectives, collaboration, reflection and articulation. Although elements such as coaching and scaffolding and authentic assessment exist during industrial attachment, postings made on the Facebook group had limited material to convince the researcher of their existence.

In authentic learning, students model processes and have access to expert performances. They rely on learning with and from experts who can be either field supervisors or other students and a diverse digital media from online resources. Authentic elements such as collaboration, articulation and reflection exist in both authentic learning and industrial attachment. The difference, however, is the way in which both can be achieved, heavily depending on the actual context and scenario in which the elements are applied.

Major differences existing between authentic learning and industrial attachment includes, the limited way in which authentic assessment can be applied to the industrial attachment programme in the context studied. Application of some elements such as Expert Performance and Multiple Perspectives exists but they are so interwoven that at times it is difficult to draw the line between the two.

In this study, it has been observed that university teaching alone without an authentic experience of the real world application is not enough to prepare students for the industry. The pedagogical goals for industrial attachment are to ensure that students have an experience that has a major impact on their learning and on their understanding of real world issues and environments. However, lack of support and isolation demotivates students and this has a negative impact to the objectives of industrial attachment.

Social media provides a solution for connecting students during industrial attachment. This shows a need for institutions to embrace ways of improving pedagogy in ways that are more current and engaging to students. Integration of such technologies in the computer science degree is perceived to introduce some way of allowing students to have an authentic experience which complements theory learnt within the first two years of the study.

Adoption of Authentic Learning as a pedagogical model is suggested in response to the need to help better prepare students for the industry and the pedagogy of authentic learning in industrial attachment programmes should be effectively appreciated in computer science. As authentic learning has been suggested as a way to bring the necessary complexity into learning to deal with challenges in professional practice after graduation, linking it to industrial attachment where students are in a real world context becomes inevitable for the computer science degree programme.

From the findings in this study, it is concluded that integration of social media being used by students, in education increases output. Tying assessments to the activities mediated by technology will increase response from students. It is against these arguments that the researcher concludes that there is a need for institutions to embrace new ways of improving pedagogy using approaches that are more familiar to and interesting for students.

5.5. Recommendations for further research

The study has shown that students' interaction and information exchange using social media enhances authentic learning during the industrial attachment period of the computer science degree programme. From this study it is recommended that:

- Social media/ relevant emerging technologies be incorporated in university programmes to mediate authentic and for supervisors to understand how authentic learning happens during this period of study. Lessons can be drawn from UNISA's distance learning tutorials that are fashioned or modeled on similar lines.

- It will be useful to create a Computer Science Industrial Attachment (CSIA) framework based on authentic learning elements. To add to this, students' interactions online are suggested to be part of the required material for assessments. This is so because it provides relevant knowledge of what actually happens when a student is attached as compared to the one day

visits and relying on the assessment from the organisation supervisor's recommendation alone.

- Research from students' industrial attachment experiences be used as input to inform relevant transformation of computer science pedagogy for Industrial Attachment.

Areas that may require further investigation with regards to research into authentic learning during industrial attachment of related degree programmes include the following:

- Further research be conducted on inclusion of what happens in the social space into the final assessments of the programme since inclusion of technology can further enhance learning if technology is able to support the learning activities and outcomes of the computer science programme.

- Further research into the inclusion of such research into the improvement and updating of the current curriculum.

- It is worthwhile to include supervisors from both the university and organisations where students are attached and research on a fully represented online connected community.

- As part of their industrial attachments reports, students should have write ups with components that will be questioned to see how they addressed them, that is challenges faced, so that a holistic approach could be taken.

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Appendix A.

Attachment Experiences Group

Table 5—0—1: Unit 1 ~ Course requirements question by student

01. PPHS September 11, 2013. Seen by everyone
02. hello guys,
03. Thanks once again 4 the group.
04. What is the first thing to do once one gets attached in terms of
05. what forms to be filled in and by when they should be sent to school?

06. TMLR September 11, 2013 at 10:31am
07. You are expected to communicate as soon as you are attached.
08. Check out the documents I uploaded earlier on this platform.
09. Other students who have already done this stage can feed us with more details on this.
10. @ MMS and MBS, if there are any other forms you filled out besides the documents I uploaded please give us details.

Table 5—0—2: Unit 2 ~ Student recommends learning programming

01. MBS September 12, 2013. Seen by everyone
01. hello good people??
02. I know how passionate most of you guys are about programming.
03. Well if you had the mentality that programming in java is tough try Headfirst Java it's a very good and simple book

04. BNS September 12, 2013 at 4:33pm
05. Is there something available online? pdf or some eBook?

06. MBS September 12, 2013 at 5:26pm · Like · 1
07. yeah pdf that's what I downloaded.
08. 2nd edition that's what I'm working with!
09. Also learn to incorporate as many new technologies as you can during you programming e.g. Maven, Wicket, and Spring Core among other technologies

10. PPHS September 13, 2013 at 6:33am · Edited
11. thanks MBS, I will get that book, I might just fall in love with java as well.

12. BNS September 13, 2013 at 7:26am ·
13. Can I have the download link

14. MBS September 25, 2013 at 11:15am · Like · 2
15. guys how far??
16. What projects are you working on?
17. Anyone with an idea of a simple project that we can collaborate on and find out if we can

come out with something meaningful? Printing2015
18. THATS WHAT I CALL PRACTISE!!
19. Remember Programming is not like "Kutonhodzwa KwaChauruka" that u can read enjoy and do nothing about it!!this is our time guys, let's explore!!

20. PPHS September 25, 2013 at 3:01pm ·
21. if u got any ideas, hit me....am always up for stuff like that.....Brilliant idea MBS
22. "KutonhodzwakwaChauruka" lol you have made my day MBS

23. TML September 25, 2013 at 3:57pm · Edited · Like · 1
24. Well I am in the Information System application area in education.
25. I would love to collaborate with anyone interested in HTML5 to build mobile applications.
26. So far I have tested a trial version of AppCobra, but it has some flows I dislike about it. So many open prototyping softwares are now available including Aptana studio, which I downloaded and m testing, Mobjectify for creating Prototypes, MMS sent a link for another one but I haven't tested it yet. but this is the idea....
27. I would like to create a system whose front end allows three roles that is
28. 1) Educator(who can Create Lessons, Tests, Give Learners feedback on tests attempted etc),
29. 2) Student/Learner who can select a subject and topic to learn on, Write a test(can be simple multiple choice where one or more answers are correct, filling in missing words, or write a paragraph that is essay type), and a Hangout and entertainment tab where students can do non-curriculum staff like chatting and watching a movie etc
30. 3)Then an administrator responsible for adding roles.
31. Backend will be a cloud-based database - whose engine can be SQL server or so.
32. This is my problem statement.
33. Any takers to this?

34. MBS I'm in!!September 25, 2013 at 4:20pm ·
35. can I have a skeleton of how far you have gone so far??

36. TML September 25, 2013 at 4:23pm ·
37. I tried out my ideas on the following but my trial version expires on
38. Friday http://www.appcobra.com/x/hietari@gmail.com/MandETool
39. M and E Tool. Created in AppCobra.
40. MBS You can try n open it from a browser instead. That's one flaw I have noticed with Appcobra- I created and uploaded it to be viewed on a mobile but I have tested it on android, Apple it failed - Even on a Windows and Opera mobile emulator, I downloaded it failed again

41. MBS September 25, 2013 at 4:25pm ·
42. okay thanks

43. MBS September 25, 2013 at 4:26pm ·
44. The page cannot be found
    The page you are looking for might have been removed, had its name changed, or is temporarily unavailable.

    Please try the following:

Make sure that the Web site address displayed in the address bar of your browser is spelled and formatted correctly.
If you reached this page by clicking a link, contact the Web site administrator to alert them that the link is incorrectly formatted.
Click the Back button to try another link.
HTTP Error 404 - File or directory not found.
Internet Information Services (IIS)
Technical Information (for support personnel)
Go to Microsoft Product Support Services and perform a title search for the words HTTP and 404.
Open IIS Help, which is accessible in IIS Manager (inetmgr), and search for topics titled Web Site Setup, Common Administrative Tasks, and About Custom Error Messages.

45. MBS September 25, 2013 at 4:27pm ·
46. that's what its displaying

47. TML September 25, 2013 at 4:29pm · Edited ·
48. The following are sketches of the idea, I will have to upload them as files.

49. MBS September 25, 2013 at 4:31pm ·
50. okay will be waiting

51. TML September 25, 2013 at 4:34pm ·
52. Done, I have pinned this post, the documents follow

53. TML September 25, 2013 at 4:36pm ·
54. In that case I think there is need for us to create a platform where specific Projects can be addressed from to avoid confusion. Or Maybe create a Shared Folder on Google docs or Dropbox - then our collaboration can be more focused. This will depend on whether all of you have either Google drive or Dropbox

55. PPHS September 25, 2013 at 5:20pm ·
56. I would probably need to sit down tomorrow and get a good grip/idea of the system.
57. But one thing am sure of is I'm also interested....I believe one more person wouldn't hurt?

58. TML September 25, 2013 at 5:23pm · Edited ·
59. no problem PPHS
60. if the post is made on this group, it surely must be able to accommodate all members.

61. PPHS September 25, 2013 at 5:29pm ·
62. Thanks madam, will get back to you tomorrow.

63. TML September 25, 2013 at 5:30pm · Like
64. Okay

Table 5—0—3: Unit 3 ~ Students and supervisor brain storm on possible projects

01. TMR September 25, 2013Seen by everyone
02. Screenshots
03. 
04. Mobile App Screenshots.pptx
05. Reference: MBS's post on development projects.

06. MBS September 25, 2013 at 4:33pm ·
07. okay I saw the screenshots! So our task here is to create a web App like that one using HTML 5??

08. **TML September 26, 2013 at 9:18am ·**
09. a mobile web app would be great instead

10. TML September 26, 2013 at 12:47pm ·
11. differences I got herehttp://www.hswsolutions.com/.../mobile-website-vs-apps/

12. Mobile Website vs. Mobile App (Application) – Which is Best for your...HSWSOLUTIONS.COM

13. MBS September 26, 2013 at 12:48pm · Like ·
14. okay got it

15. TML September 26, 2013 at 12:49pm · Like
16. MMS also has an interesting one so will chat to him and c if he can post the problem statement as well

Table 5—0—4: Unit 4 ~ Project brainstorming continuation

17. TMR September 25, 2013Seen by everyone
18. Screenshots
19. 
20. Mobile App Screenshots.pptx
21. Reference: MBS's post on development projects.

22. MBS September 25, 2013 at 4:33pm ·
23. okay I saw the screenshots! So our task here is to create a web App like that one using HTML 5??

24. **TML September 26, 2013 at 9:18am ·**
25. a mobile web app would be great instead

26. **TML September 26, 2013 at 12:47pm ·**
27. differences I got herehttp://www.hswsolutions.com/.../mobile-website-vs-apps/

28. Mobile Website vs. Mobile App (Application) – Which is Best for your...HSWSOLUTIONS.COM

29. **MBS September 26, 2013 at 12:48pm · Like ·**
30. okay got it

31. **TML September 26, 2013 at 12:49pm · Like**
32. MMS also has an interesting one so will chat to him and c if he can post the problem statement as well

Table 5—0—5: Unit 5 ~ Students invites others for a hackathon

01. **BNS October 24, 2013Seen by everyone**
02. You guys should check this out, sorry it might be a bit late but I registered and am going..... http://www.muzindaumuzihub.com/index.php#
03. and you might want to follow them on twitter @MuzindaHub
04. Muzinda Umuzi Hub - Hackathon
05. MUZINDAUMUZIHUB.COM

07. **PPHS October 24, 2013 at 3:50pmSeen by everyone**
08. where is the venue at dude?

09. **BNS October 24, 2013 at 5:12pm.**
10. Vainona, but to register, u have to email them then they confirm...

11. **BNS October 24, 2013 at 5:13pm**
12. or call

01. **PPHS November 22, 2013**
02. can anyone help me with the Industrial Liaison Officer's email address.

04. **HGGS November 25, 2013 at 8:17am**
05. **36**can u help with a placement form

06. **PPHS November 25, 2013 at 9:15am**
07. ... attached them all in one of her posts on this group, check all her posts you'll find them

08. HHGS November 25, 2013 at 10:32am · Like · 1
09. Thanks, maam

Table 5—0—6: Unit 6 ~ Students posts an attachment placement available

01. PPHS. January 9Seen by everyone
02. there is a company looking for an IT attachee a.s.a.p but they want someone with extensive knowledge ye web designing. send your CV's to me on paidamoyo.hleremah@zw.gt.com

04. TMS January 15 at 1:01pm
05. I heard from yesterday's meeting that LMS is the only one not yet attached, please check with him and c if you can help

06. TMS January 15 at 1:06pmSeen by everyone
07. Hi all, just reminding you that you should make sure you are done on your first report by end of January, first assessment is scheduled to start any-time in February but you will be communicated to officially through your emails, so please keep checking your mails.
09. If you don't have the guidelines check on this platform under files.

10. **PDS. January 15 at 1:06pm**
11. how many pages at most are needed

12. **HGGS .January 16 at 3:04pm**
13. thank you

14. **TML January 20 at 12:58pm**
15. the attachment guide is not specific on number of pages but most reports i have seen so far are between 40 and 60 pages

16. **PDS January 20 at 12:58pm**
17. thanks maam

18. HGGS January 21 at 2:35pm
19. thanks

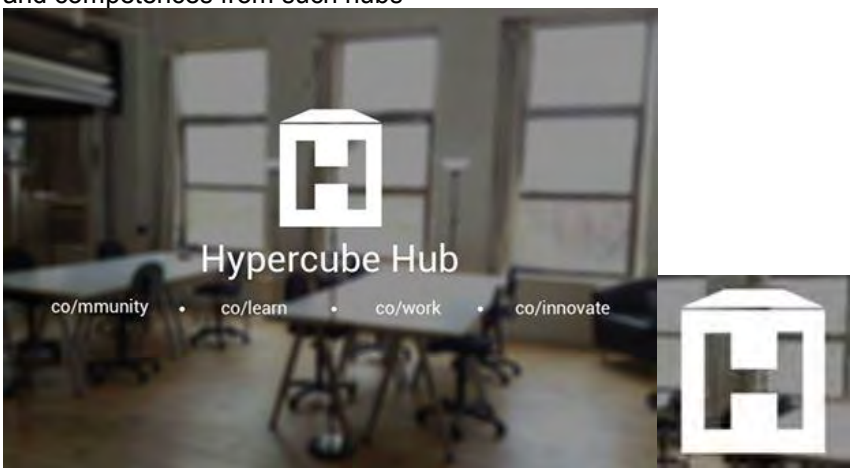
Table5—0—7: Unit 7 ~ Student shared information

01. **MMS February 6Thursday, February 6 at 3:15p.m Seen by 16PPHS likes this.**
02. shared Hypercube Hub's event.
03. Today I also attend thishttps://www.facebook.com/events/577965792273747/?source=1 and they requested me to prepare a presentation for them on health informatics. Just think about where you want to be and start going towards that right now. You won't find this in a lecture.

04.
05. **What is the Lean Startup Machine? Come find out more & let's unlock Harare!**
06. Hypercube Hub, 11 Phillips Ave, Belgravia, Harare, ZW3 people went

Table 5—0—8: Unit 8 ~ Student shared information2

01. **MMS February 6 913 LikesSeen by 16**
02. There is still another hub where young people share ideas herehttps://www.facebook.com/HypercubeHub, you can take this opportunity to attend their events while time allows, you can as well easily find an employer through your participation and competences from such hubs

03. 

04. **MMS February 6 at 5:53pm**
05. There is also an event to come which will include guys from the silicon valley right here in Harare so you better check it outHypercube Hub

06. **MMS February 6 at 6:30pm**
07. Cast your votes for the workshop to be held in Zimbabwehttp://l3an.com/1iwOLHj
08. 
09. Help me bring Lean Startup Machine to Harare

Table 5—0—9: Unit 9 ~ Student referes to industrial attachment guidelines

01. **BMSFebruary 10 Seen by 16 PPHS** likes this.
02. Sections 4.1.3 and 4.2.4 of the Industrial Attachment Guideline--You are not supposed to demand a salary/pediem where you are attached, it's learning only not a money making adventure!
03. Hehehe How you doing guys?
04. Are you done with your reports?
05. You will be left out while others are moving fast!!!

06. **MBS February 11 at 10:26am**
07. What do we do BNS??

08. **BMS February 12 at 7:33am**
09. inbox me your number MBS

10. **MBS February 12 at 7:38am**
11. sharp!

12. **MBS February 14 at 3:08pm**
13. my number is a public secret my friend BNS its **********

Table 5—0—10: Unit 10 ~ Student asks for help

01. **PPHS March 13Seen by 16**
02. I have a question guys.... has anyone come across a problem whereby your excel document wont print bolded text as bold here, print preview window shows your document with bold but the hard copy doesn't come out in bold....anyone to help

03. **TML March 13 at 4:50pm**
04. I have never come across that problem. However I tried to do a search online and it says you can try to change font, Maybe your printer is failing to recognise the font you are printing with

05. **TML** http://www.teachexcel.com/excel-help/excel-how-to.php...

06. 

07.
08. Excel - Shows Bold But Wont Print Bold - I have a spreadsheet... - Free Excel Help
09. Shows Bold But Wont Print Bold - I have a...
10. TEACHEXCEL.COM

11. TML March 13 at 4:51pm
12. first option

13. MMS March 13 at 6:32pm. Like · 1
14. The problem is with the font you are using try to change it to Arial or Times New Roman or other fonts and see if it's the same problem

Table 5—0—11: Unit 11 ~ Question on authentic element 2

01. TML March 18Seen by 16 4 LIKES
02. In terms of the tasks assigned to you at the organisation you were attached, were there tasks that you were assigned to that needed team effort to be completed?
03. Explain how you went about solving these and your team work experience on this.

05. MBS March 18 at 2:29pm ·3 LIKES ·
06. In my case since we use the Scrum approach to software development, there is hardly anything that you can do without considering your team.
07. In life we all have differences but if we want to achieve results we should put aside all our differences yield results and move on to the next step.
08. More so I learnt to acknowledge what's in the next person whether senior or junior that I myself don't have and learnt to be humble enough so that I can benefit from whatever the next person has.
09. One last thing if you contribute to the team, the team will also contribute to you.
10. Don't be selfish with what you have because in most cases the next person might be having a better, more efficient way of doing the things that you are being selfish with.

11. MMS March 18 at 5:28pm · Like · 1
12. Team work is the best way to get objectives achieved in time.
13. I have noticed that in a team we have to identify team member strengths and weaknesses and base on them on allocating tasks.
14. This helped us to get the job done in time rather than allocating tasks to resources that are not competent.
15. From my experience, team work in most cases work well though there are some individuals who won't deliver in time.
16. Many strategies can be employed to get such individuals work.
17. By the time I had to lead a team, I could push those I was close to and those who I can convince to work so that at update meetings it's easier to say most of the team is done but we are still waiting for such individual.

18. This could automatically push the individuals to work in time.

19. PPHS March 20 at 4:17pm · Edited · Like · 1

20. well in my case its almost 50-50 but for those tasks that we undertook as a team, I learnt quite a couple of things.
21. Things like the need to respect other colleagues' views and opinions, not look down upon others coz you never know where and how the brilliant ideas will come about.
22. Once you do that, chances are you will give a blind eye to suggestions that might be befitting to your situation.
23. I got to work with the guys from the graphic design dept prior the launch of a new whistle blower programme and my role was to assist with the technical aspects to design the flyers, brochures and a slideshow.
24. It was quite fascinating to discover that you'd see some of your contributions making it to the final piece and also how someone can come up with some good point(something you'd notice you could not have thought of).....but all being said, the key to a successful team are open channels of communication.
25. You need to convey your ideas, it's not like it's an assignment in which you can pass alone or something. "proper communication channels are very crucial" , I learnt.

Table 5—0—12: Unit 12 ~ Question on what students are experiencing practically

01. TML March 20 · Edited Seen by 16

02. Are you busy connecting network cables, troubleshooting, changing a power supply unit, changing printer rollers, coding, blowing desktops or even shredding paper?
03. Share your photos and let's see you at work on Industrial attachment. If you are shy you are allowed to hide your sweet face!!!

05. SNS March 20 at 3:47pm

06. yes I am learning a lot

07. TMS March 20 at 5:03pm

08. @ SNS, share with us what you are learning

09. SNS March 21 at 8:55am

10. the organisation is using an accounting system and I increased my knowledge to this system of accounting ,
11. also learn networking the setting of the switch ,router ,creating of networking flyers and many more,
12. also I am doing Programming but i am facing a lot of challenges in the Programming part

13. PPHS March 21 at 10:18am 2 Likes

14. Optic fibre junction box.....the company was moving over to fibre network and we got the opportunity to experience its setting up and configurations.
15. In the images, we were cleaving and splicing the optic cables, bridging from the mother fibre to the main switch of the IT dept.

16. 

17. **PPHS March 21 at 10:29am 2 Likes**
18. an existing underground fibre cable where we were branching ours from
19. 

20. **PPHS March 21 at 10:34am · Like · 2**

Table 5—0—13: Unit 13 ~ Question on authentic learning environment

01. **TML March 3Seen by 16 GCS likes this.**
02. Basing on your own experience on industrial attachment, how would you explain the environment you are/were exposed to in terms of the tasks assigned to you by your supervisor or the experience you got from tasks you undertook?
03. In other words, were you exposed to a complex environment that needed real solutions?
04. Explain how long it took you to complete tasks assigned to you, and the steps you went through in completing those tasks.

06. **MBS March 4 at 7:48am · Like · 1**
07. Well as for me I was exposed to an environment that was far much beyond my abilities. The good thing is I learnt to adjust so that I could suit my new environment.
08. The environment that I am in is characterised with multi tasking and the implementation of most of all the practical aspects of the things learnt at school so far.
09. So in order to meet the set objectives I learnt to get out of office at around 8pm almost on a daily bases and continue with my work when I get home, get a short sleep starting around 12am only to work up again at 5 30 in the morning.
10. During the first days it was very tough and I would sometimes sleep in office but with time I got used to it.

11. I made it a policy that on each and every day I have to learn a new thing or a new concept.

12. PPHS March 13 at 4:19pm · Edited · Like · 1

13. I am a person who always did my level best and made sure I perfectly completed tasks assigned to me, be it presentations, school assignments, or anything.
14. When I started attachment I thought I had it all figured out.
15. The kind of environment I'm at is an audit environment where the greater deal of work is done outside the work premises (that is at client being audited.....we also do IT audit).
16. So when one encounters an IT related problem and it can't be fixed over the phone, they would have to come to the offices after hours or early in the morning.
17. At first I could not handle the pressure as when laptops starts coming they will be many, each user wanting his/her problem solved first.
18. This would get to the extent that some will be angry with you that you are delaying processes.
19. that pressure alone can confuse the crap out of you such that even something you know you will end up confused and everybody would be asking questions....
20. So what are you doing now?....
21. What seems to be the problem?....
22. and why are you doing that?....
23. Are you not making it worse?

24. PPHS March 13 at 3:57pm · Unlike · 1

25. ....and so on.
26. But I later learnt to handle such pressure, I now know what to say and what not to say, I now try by all means that they all understand what I would be doing, conversing with them all in a polite manner such that no one gets pissed off.....
27. my point is, I knew I could try my best to deliver but that concept of working under pressure and with minimum supervision was a bit too much for.
28. I would get so frustrated at times but my supervisor later told me that's how people are, we all have diff personalities and as an IT guy, you work with everyone in the firm so you must be prepared to handle diff situations as they come.

29. PDS March 14 at 3:05pm · Like · 1

30. Where I am attached, there is a matter of priority. You have to attend to bosses first.
31. Bosses offices should have everything in order.
32. especially their networks and printers should be just fine.

33. TML March 15 at 4:54am ·

34. @PDS : so the help desk system that people use to log their calls is not followed?

35. PDS March 15 at 7:35am ·

36. now it's difficult for users to follow it because the helpdesk analyst is at another campus, these offices are being used but under construction so communication is still a challenge

37. GCS March 17 at 11:35am · Like · 2

38. The attachment programme is one of the greatest wealth of exposure, experience, opportunities and lesson on both business and social ever happened in my life.
39. The programme is an eye opening machine in many areas, especially when assigned very

difficult tasks and duties to execute.

40. During the early days of my attachment I was scared to attend to user calla raised by the senior management and attend to new problems but with the time I was able to attend to any call.
41. I always find a way to troubleshoot so that the user goes back to work. since am more involved in the support side of IT I discovered that the time one spends in office does not determine the efficiency and effectiveness of executing tasks but rather the willingness to learn.
42. At times I am asked to perform several tasks AT once which is impossible but does not mean that one is inefficient.
43. At first I had challenges with other users requiring preferential treatment, doubting one's intern's ability to solve their problems. instead they would specifically ask for another IT personal or the other intern assistance.

44. GCS March 17 at 3:03pm · Like · 1

45. when I got into industry I realized that as IT personnel one is not limited to difficult challenges. I also have to attend to easy challenges , for example, user failure to access their e-mails simply because a network cable is unplugged or one fails to open a word Microsoft document.
46. I discovered that users have a totally different perception of IT personal.
47. Users think that IT personal know everything technological and should always succeed in solving their queries.
48. I also faced many challenges in maintaining the ICT structure and services so as to increase IT efficiency and effectiveness.
49. These challenges are being complicated by the demands of an increasingly complex IT environment, user expectations Limited IT resources and user problems

50. GCS March 17 at 3:10pm · Like · 2

51. However I noticed a common approach that was particularly emphasized by the supervisor.
52. To create effective communication especially if you are to attend the user's problem, I reported to the supervisor on the task I have to do.
53. To ensure that appropriate guidance is given prior to execution of the task

54. SMS March 18 at 11:03am · Like · 2

55. all along, I had the impression that the attachment period is all about being told what to do by the supervisors and simply following instructions.
56. But in actual fact, some of the tasks that are assigned to me require referring back to notes I wrote during first and second year, reading tutorials online, downloading video lectures, etc, so as to work my way round the task., at the same time staying within the time period specified to complete the task.

57. TML March 18 at 11:21am ·

58. @ SMS , so did you always meet the assigned time period assigned to each task?

59. SMS March 18 at 12:27pm · Edited ·

60. no, not always....some of the tasks I take a little longer than expected but I try that most of them I needed to finish in time.

61. **MHS** March 18 at 5:06pm · Like · 1
62. The industrial attachment is going well but full of challenges especially when you don't know what is supposed to be done.
63. I'm attached at *** under V.A.S (value added services) department were all the promotions involving voice and data are coded and tested .
64. We have a daily scrum which shows each and every project one is working on and the associated sub tasks .
65. The scrum has also timelines and it has to be send to the boss every week or any time he demands it .
66. You have to explain the reason why ho haven't met the timeline in the weekly meeting and this has boosted my work performance since you will be working according to a target.
67. I am also supposed to write a summary or a report for each and every design session held which would however send to the vas-forwards group were everyone in our department is involved then you need to copy our boss.
68. This was so tough to me at the first days when I was assigned the job as sometimes after the design session I was told to draw the use-case diagrams for the suggested project guided by a document called a concept note which clearly explains what and how the project is going to work .
69. This actually droves me to software engineering notes as well as video tutorials on YouTube.

70. TMS March 19 at 4:31pm · Like · 2

71. My attachment is well but during the first days it was hard to adjust to the environment since it is a busy environment.
72. Here at ***** all the systems are managed by one ICT Department of which all the stations in the country are managed by this ICT department which is centralized in ***** so every day we work to ensure good ICT services are carried out which in fact result in task assigned to us.
73. Every week I am assigned a task which I am told to finish by the end of the day and at the same time I should not affect my day to day working basis at work because these tasks are regarded as a sidekick and also were I'm not understanding my supervisor encourage me to consult and ask without hesitation.
74. There is encouragement of hardworking and research because they encourage us to research a lot that is if you are to face a challenge you do not quickly rush and consult your supervisor, you can research and find the nature of the problem and try and diagnose from there and in some way this improve your confidence in the section.
75. Also you have to able to handle pressure and be patient with novice users who are not used to the ICT environment.
76. For example here at ZIMRA they made a policy that every user should use windows 8.1 which was introduced earlier on so this was a constraint to some users since they were failing to adopt the new operating system since they preferred windows 7 than windows 8.1. So you had to be patient with these users because some of them would be harsh and go to extremes so that they would not use windows 8.1.
77. Technology is growing so as an ICT department we try by all means to engage ourselves to the latest and efficient systems which improve the day to day working basis of the organization.
78. Also I usually strategize my working daily basis and prioritize to finish urgent matter by the end of the day so that the work load is limited and also I try to maximize and try by all means to learn whilst under pressure.

79. CMS March 22 at 3:36pm · Like · 1

80. My attachment is going on well and it if full of ups and downs.

81. The very good thing about it is that I am really exposed to what happens in the industry.
82. At met they used to leave all the dirty and junky work to us especially hardware related issues.
83. We wouldn't spend a day without opening a machine.
84. The good thing about this is that now I know almost all the hardware parts and I can't even identify them.
85. The bad part was part was I was not exposed to coding cause they were using a language that I was not familiar with and the other thing is they relied in hiring expects when it comes to coding they were many special systems but those systems were maintained but people in France.
86. In conclusion I so that in our industries in Zimbabwe most people concentrate in networking and database administration when it comes to other IT issues people relied in hiring foreign expects in that field

87. **BNS March 30 at 12:23am · Edited · Like · 2**
88. I wouldn't say my attachment environment was complex or simple, I would go for average.
89. I have to confess I had difficulties coping.
90. Most of the assignments or tasks I had to do on my own then present to my supervisor.
91. I remember the other time he kept asking me for a long overdue template of the organisation's website which took me more than a month to complete.
92. It took me long to complete some of the tasks but some which where web based I could not finish on time because of internet problems; either it was slow or there was no connection at all.
93. My first task took me two weeks to work around and it involved installing a loan tracking MIS and learn how to use it.
94. There are moments where I have to go back to my notes or teach myself staff using web tutorials.
95. My attachment had/has its ups and downs but overall I did and am still learning a lot.

Table 5—0—14: Unit 14 ~ Student asks for help

01. **SNS March 21Seen by 16**
02. guys what might be the problem if a laptop shutdown and fails to boot again displaying bank screen caps lock and lights blinking

04. **PPHS March 24 at 9:32am ·**
05. just a blank screen and no message displayed?

06. **SNS March 24 at 10:24am ·**
07. yes PPHS

08. **PPHS March 24 at 4:37pm · Like · 1**
09. If it keeps showing black its most probably RAM, how big is your RAM and OS are you running?.....
10. One thing I've noted with RAM especially for laptops is it can work on one machine and fail on another depending with the specifications.

11. **TKS March 25 at 8:52am · Like · 1**

12. Correct, remove RAM and reinstall it, if the problem persist connect an external monitor.
13. If it still fails, the problem could be VGA

14. SNS March 25 at 2:17pm ·
15. PPHS I heard you, so what's the solution in that situation. I bought another one annd it failed.
16. TKS I tried that as well, it failed

17. TML March 25 at 4:02pm · Like · 1 · Remove Preview
18. http://h30434.www3.hp.com/.../blinking.../td-p/1237727
19. 
blinking nums lock/ caps lock -blank screen- - HP Support Forum - 1237727
20. 1) Windows 7 2) Laptop Screen blank-external video...

21. TML March 25 at 4:03pm ·
22. Maybe this might also help in your troubleshooting exercise.

23. MBS March 25 at 4:12pm · Like · 1
24. Maybe its Kernel panic if u are using Linux!
25. If its windows try booting in safe mode!!

26. SNS March 25 at 4:24pm ·
27. ok thanks

28. PPHS March 25 at 4:30pm ·
29. play around with RAM slots.

30. TMS March 30 at 6:27pm · Edited ·
31. @SNSIs your laptop running now?

32. SNS March 31 at 7:09am ·
33. no maam nothing changed

34. BNS March 31 at 10:01am · Like · 2 · Remove Preview
35. When a laptop fails to display anything and the caps lock light or any other light blinks it might be a lot of things really.
36. It might be ram, vga, or the cpu is completely fried or failure to send info to the hdd.
37. In most cases I have noticed that you just need to take the ram out and put it back or the hdd got shocked.
38. Best thing is taking note of what the laptop is doing and not doing and carry out those simple tests on vga, fan, hdd etc as this will help you narrow down what the real problem might be.
39. When all fails you can start panicking (lol hehehe);
40. you just take note of the brand name and model then visit the troubleshooting pages

available from the brand website and go through the step by step troubleshooting notes available.
41. They don't always work but they do give you an idea of what's really going on.
42. A good example is this page ye HP ------ http://h10025.www1.hp.com/ewfrf/wc/document?cc=us&lc=en...
43. 
44. Blank Screen LED Error Codes | HP® Support
45. Details the types of LED blink codes that may occur in...
46. H10025.WWW1.HP.COM

47. **SNS March 31 at 10:34am ·**
48. You are right BNS I am in panic mode now

49. **TKS April 1 at 10:13am · Like · 1**
50. Be careful when handling the RAM and the HDD coz its static .
51. then check some small bus cables from mother board to screen.

52. **SNS April 1 at 12:41pm ·**
53. thanks I have tried all but nothing worked

Table 5—0—15: Unit 15 ~Question on reflection

01. **TML** March 30Seen by 16
02. Reflecting on your practical during industrial attachment, can you discuss how you went about solving the complex problems you were assigned to, and how you have improved in delivering quality service the next time you were assigned a similar task.
03. You can use examples of the actual tasks you were assigned.

05. **BNS** March 30
06. The awesome thing about attachment is there is quite a huge room to just learn; watch how staff is done and then try doing it yourself.
07. Given a complex task and you have no idea how to go about it; the only thing I now know and will always do is ask where I do not understand and seek help when I'm stuck even if it means seeking help from our beloved Google.
08. One time we had no wifi and there was only one modem (Africom) and I was tasked to find a way to make sure people can access the internet if they needed it.
09. It's pretty simple if you have your Connectify or any other internet sharing software but that day I was very unlucky as I did not have all that.
10. I did however learn that even without Connectify you can still share internet with just windows.
11. I worked my way around using the adhoc feature and it worked but it took me more than an hour to finally figure out how to properly do it; unfortunately people complained it was very slow!
12. I have been exposed to different kinds of situations, some of them simple and some

complex and regardless of how or the time I took to accomplish them , I have grown technically and can deliver better or even quality service next time I come across similar tasks.

Table 5—0—16: Unit 16 ~ Question on articulation

01. TML April 1Seen by 16
02. How did you find the process of writing your first report during attachment?
03. What kind of strategy did you use to remember what you did in your writing?
04. Are there any changes that you will implement in writing your second report?

06. MBS April 1 at 6:01pm · Like · 1
07. Writing the first report for me was a little bit of a challenge to me.
08. The main challenge was time management.
09. Daily pressure from the workplace gave me no time to rest at all.
10. My logbook was my main source of information, that is it is very useful to log things in your logbook as they happen.
11. So I time table which puts my Saturday evening as the time to update my documents.

12. DZS April 1 at 9:49pm · Edited ·
13. On writing my 1st report it was not something difficult for me since most of the work was done under supervisory support.
14. Used to have a pocket diary which I used to jot down accomplished tasks and some few challenges I met, but always should learn to manage your time wisely that is at each week ending should compile all the concepts, problems and solutions you met.
15. On my own suggestions in order to have a better report one should have to schedule a timetable were you compile challenges ,tasks accomplished and suggestions for improvements you made

16. BNS April 2 at 2:57am · Edited ·
17. How many pages? Is it narrative or a simple summary?
18. How do you structure the whole thing?
19. These are some of the questions I still ask myself even up to now.
20. Of course we have the guideline and objectives but as student as I am will always be kind of timid and just wondering if that's what "PPHS" is doing and how his is coming out.
21. Kept a diary and a logbook(soft copy) which I used to record work activities, challenges and lessons learnt.
22. Even with all these tools available it took me quite a while to come up with something solid.
23. I think my next report will basically be easier to write and I am going to use just about the same format.

24. SNS April 2 at 7:11am ·
25. Writing my first report was not difficult for me because each and every task i wrote on my diary book and also my logbook .
26. This makes it easy to write my first report because of my two sources log and diary book.

27. SNS April 2 at 7:13am ·
28. BNS if you wrote at least 36 and more pages because if you summarize you will left

something we need to know about your industrial attachment experience

29. PPHS April 2 at 10:39am · Edited ·
30. well my first report was a bit of a challenge.
31. I have never come across a 1st quarter attachment report so I didn't how different it would be the final report.
32. We do have the guidelines but there are certain things I didn't know how to write them in the report.
33. I think the major drawback is we do not have much of a report writing experience regardless of having quite clear guidelines.
34. Documentation of daily activities is up to date, better still in my case we have what we call the Great soft Practice Management System (web-based).
35. Every employee have an account and you log your daily activities there which will later be reviewed by your superiors.
36. You can actually extract information from there.
37. I believe most of us do have the content but how to present it in a report now becomes a problem.

Table 5—0—17: Unit 17 ~ Supervisor giving students information

01. TMLApril 24Seen by 15CMSand PPHS like this.
02. Tip: You should be finalising your second report by now.

Table 0—18: Unit 18 ~ Question on perceptions

01. TML March 27 · Edited · Seen by 16 GCS likes this.
02. What is it that you think if improved (from both the organisation attached at and the Computer Science Department) would have made your attachment experience achieve the set objectives?

04. MMS March 29 at 11:17am · Edited · Like · 5
05. I think from the organizations if they move away from taking interns to fill gaps in the organizations or vacant posts and let they have a planed schedule for interns to ensure that the interns are exposed to all the available areas of expertise in the particular organization.
06. You can find that a certain intern may be given an office which is vacant and that office has a backlog since no one was doing the work, it might be data capturing or updating records in most cases.
07. That student is now spending the whole year firefighting for the organization but not getting adequate expected experience and won't achieve the set objectives .
08. From the department if they can try to use modern technology that is the environment from which we are learning is actually different from what is in the industry.
09. when going into the industry it then seems as if everything becomes new and you have to learn all new.
10. I was introduced to a number of tools that I have never head of at the university but these tools to my surprise are day to day tools in the industry.
11. This actually limits our innovation. I believe innovation should come from university research.
12. If I could have been introduced to such tools at college by attachment period I could have achieved my objective of coming up with an idea and implementing it but the attachment

period passed when I was still in the learning curve for the tools.
13. I might say let them improve the practical part in the university and not wait only for attaching organizations to provide the practical experience.
14. Some organizations may not provide the desired practical experiences.

15. BNS March 30 at 12:01am · Edited · Like · 2

16. Firstly I really feel our department has to be in a position to make sure their students get attached to organisations that at least offer their students the required experience, where they can at least achieve above half the set objectives.
17. I wouldn't expect a Comp Science student to sit around in an office without a computer and internet!
18. The department should be aware and be able to recommend which organisations are capable of providing the required experience for, not just any student but a computer science student.
19. First few months as an intern where quite confusing as I was not sure what I should do and when and that's because my organisation had no job description for an IT guy; that's another setback coz the moment there is no job description there is no way you can come up with a work plan.
20. We did however come up with a job description for the organisation's IT officer.
21. There was one moment when there was a little debate on whether or not I was to go on field trips.
22. I remember this was an office discussion and some1 actually argued that an IT guy has no business going to field trips coz there are no computers'.
23. I believe when you on the job you have to do everything as long as its work; you have to experience every part of the organisation's activities and if necessary apply or come up with ideas of how IT can be incorporated in those tasks that are said to be non-IT. Overall I feel both our department and the organisations we are attached to have to be in a position to help us achieve our attachment objectives.

24. MBS April 1 at 5:51pm · Like · 4

25. I think the Computer Science Department should be more practical oriented, because computer science is more like an art and yes the theory is very much vital but it needs to be accompanied by a strong practical backup.
26. More so the computer science department should start making use of field trips just like any other departments.
27. This is very helpful in that students get to know what really happens in the industry way before they get a feel of the working environment.
28. The other issue is technology is not going backwards so the department should make sure that the latest developments in technology are implemented.
29. One last issue is we are a computer science department hence the way we do everything should be technological, that is let the students create systems that the department will use as a way of encouraging the spirit of research and development research in our students as well as boosting their moral.
30. Some students may be biased on the non Programming side of computer science, let those come up with innovative ideas that will be examined and implemented.
31. I know this is more political but I have to say it, organisations should give students some money because the reason why the full potential of many students is not being realised is because of poor social backgrounds, and daily stress on what somebody is going to eat, how someone is going to pay rent plus a whole lot of worries.

32. PPHS April 2 at 10:46am · Edited · Like · 1

33. damn!!!! MBS,I like.....

34. TML April 1 at 7:00pm · Edited · Like · 1 · Remove Preview

35. I must say these conversations are really making me see something I would want the whole world to see!!!!! Money, tea, technology.....cant separate these.
36. A Google intern says "You won't starve working at google".
37. http://www.businessinsider.com/what-its-really-like-to-be...
38.
39. 
40. What It's Really Like To Be A Google Intern
41. Google interns tell all.
42. BUSINESSINSIDER.COM

43. MBS April 1 at 7:17pm ·

44. Very inspirational, the Google intern-ship programme.
45. This is why Google is very successful those guys knows what motivates a worker whether intern or full time.

46. PPHS April 2 at 11:00am · Like · 1

47. I really feel our lecturers should sort of arrange a meeting with our supervisors once a student gets attached.
48. I know they are written objectives and expectations but I also feel there has to be a closer r/shp between the two parties.
49. Also to assess the working environment, for example: 1st two months I was at this company, we were 5 interns from IT at an organisation equally big with the one I'm at now (where am the only intern).
50. You'd find that the productivity of the attachment will be compromised, worse still if you're someone who is not forthcoming.
51. There is certain staff that you will spend the rest of attachment not knowing just because they feel you are still an amateur, you get sidelined in participating in such tasks yet that's the feel of industry we're looking for.

52. PPHS April 2 at 11:54am · Edited ·

53. I also think the university should create an environment that when you go out in the industry, you can easily adjust.
54. Why not try and imitate how they are using IT systems in the industry or rather why not familiarize us student with the feel of industry way before we go on attachment.
55. Most of the things I saw were all new to me.
56. For instance I didn't know Microsoft outlook could be used as an interface to your email, I had to start learning outlook and you can imagine what it's like when an ordinary user seemingly knows outlook more than you do yet expecting you to assist them.
57. My point is I knew computer science but only the theory side, implementing the theory to practical now becomes a challenge.
58. "It's like u don't have any qualification, gets called for a job and you will start learning your job when you actually are not supposed to start from point zero (at least somewhere

higher.....point 5 maybe lol)."

59. HGGS May 9 at 3:28pm ·
60. Yes I agree with you PPHS because at first it's hard to adjust to the new working environment.

61. MBS May 9 at 5:16pm ·
62. Hi?
63. Anybody who has been assessed out there?
64. You can be left out unknowingly

65. PPHS May 10 at 12:34pm ·
66. For me, Not yet.....
67. Anyone in Hararewho has been assessed???

68. BNS May 10 at 12:45pm ·
69. Saw one lecturer on Thursday,
70. He said there are a number of programmes running and they are busy at the department. There are a few members at the department currently.
71. Conventional Exams are starting so the pressure is too high

72. HGGSMay 10 at 6:56pm · Like · 2
73. Noone will be left out. God is with us all.

Table 5—0—19: Unit 19 ~ Student asks a question

01. BNS April 10Seen by 16
02. You are an ICT Consultant and someone calls you and says they forgot their laptop password and they really need your help whatever the cost.
03. They tell you about their project in there, deadlines and how they might lose their job if you don't help.
04. What would you do?

06. MMS April 10 at 9:11am · Like · 2
07. Linux allows you to run live disc even from a flash-disk, you can mount the NTSF formatted drive take all that you need and reinstall windows,
08. or if the administrator's account is enabled on the machine you can use and change the password for the specific user that account which sounds simple but you have to know what you are doing.

09. HGGS May 12 at 8:45am ·
10. yes this works MMS and also you can slave the laptop hard drive and save all documents and reinstall windows.
11. after that you may copy back the documents in the laptop

12. MBS June 6 at 11:11am ·
13. and submit an invoice with at least a 5 digit figure for your services.
14. Remember this part it's very important!
15.
16. **DZS June 6 at 5:55pm ·**
17. kkkkkk you crazy dude....
18. But aren't there any user software that you going to use to crack the password?

Developers Group

Table 5—0—20: Unit 20 ~ Question on articulation

01. TMLApril 1Seen by 10
02. How did you find the process of writing your first and second report during attachment?
03. What kind of strategy did you use to remember what you did in your writing?
04. How did you find the process of presenting your final industrial attachment experience?

06. FHS April 1 at 5:13pm · Like · 1
07. logbook was my best helper in writing the reports because everything I learnt I wrote it down putting the dates so when It comes to the time of report writing I just used the information that was in the logbook with the help of Google in giving detailed information on what I learnt.
08. I also used the attachment report guidelines from our attachment coordinator and I used other students' reports who were attached BUSE

09. FHS April 1 at 5:16pm · Like · 1
10. on presentations I just summarised my 2 reports and make a good presentation but I didn't have any idea of what to include in the ppt presentation ,
11. I was lucky during presentations because I put all the information I know about so when it comes to questions time I just replied with a smiling face showing my knowledge about the things I said

12. FHS April 1 at 5:20pm ·
13. attachment presentation was my first presentation doing it in front of the panel which consists comp science lecturers
14. so my heart was beating ,u know stage fright thinking that they are going to ask more questions not knowing that they will take note of what u r saying & asking u questions on that so the secret is to make a PowerPoint of things that you know

15. PTDSApril 1 at 5:28pm ·
16. asFHS said the logbook came handy it was easy to write up my reports because all the information was available

17. **PTDS** April 1 at 5:38pm ·
18. on the attachment presentation I had no idea how to come up with one so I had to look for the past attachment presentations of others and copy format.
19. on the day to present it was so frightening all the lecturers were there but fortunately I knew what I had done so it was easy and went through it easily

20. VCS April 1 at 6:51pm · Like · 1
21. as for how to write reports all was made simple because the attachment coordinator emailed guidelines.
22. The challenge was on how logbook and final presentation was to be structured.
23. Fortunately we held meetings as a class and shared ideas on how to go about it ,since some had communications with senior students and lecturers who were supportive to us
24. This helped me a lot and gave me confidence in my writing and presentations .

25. I will be forever grateful to the cooperation we had as a class and would urge other students to do so.

26. ZAMS April 1 at 7:00pm · Like · 3

27. Hie,,
28. I thought of saying something also...On my part, I just followed the guidelines closely and got lots of help from my supervisor @ NRZ,and from my classmates also....wish u all e best graduating class of 2014!!!

29. PTDS April 1 at 8:51pm ·

30. ZAMS thanks so much.
31. VCS u can say that a million times.
32. We helped each other as a group and it worked for the good

33. PCS April 2 at 3:07pm ·

34. Writing my report to say the honest truth for me was challenging coz even if I had guidelines sometimes I would wonder if I'm writing the report well or to the standard required.
35. But be that as it may I made use of my weekly and monthly performance reports at work along with my logbook to remember what I had done.

36. PCS April 2 at 3:09pm ·

37. As for the attachment presentations I jus faced a slight challenge in creating the power point coz we didn't have a guideline of some sort to tell you what u were to present on exactly but we pulled through in the end

38. MMS April 4 at 12:26pm ·

39. Writing my report has not been a problem since I have kept a compact logbook of my day to day activities including some backup copies of whichever material I used on certain tasks that I was assigned to.
40. Some of the task are done on a day to day basis and those I could not record in my logbook and treated them as routine tasks.
41. The first report was the most taxing to write since it was doing a new thing.
42. The second report was a continuation but detailed since the light was shed buy the writing of the first attachment.
43. Strategy: I came up with an idea of updating my logbook every Friday unless I did something very new and interesting midweek that's when I could get to update it mid week.
44. I had also to update my report every four weeks though sometimes I could not stick to that.
45. For the presentation I was Ok with the panel since most of the faces I knew them.
46. My biggest problem was a lot of staff in my slides which gave the panel ideas to come up with more questions for me.
47. Luckily I had ideas about what I included in the slides so I could defend myself.

Table 5—0—21: Unit 21 ~ Question on perceptions

01. TML March 27Seen by 9 PTDS likes this.
02. Repost: What is it that you think if improved (from both the organisation attached at and the Computer Science Department) would have made your attachment experience achieve the set objectives.

04. PTDS March 28 at 4:19pm · Like · 2
05. Personally I think if the department helped us in looking for attachment places it would be easier for us because some got attachment places later which means learning time at the organization is shorter as well.
06. The other thing is at the two organizations I was at,attachees are restricted to the most vital parts of IT department which is what we should learn
07. Like the server rooms were out of bound to students as well as we did not have access to databases and above all there was no Programming done which means areas of exposure already were now few

08. PTDS March 28 at 4:36pm · Like · 1
09. I also think if the department would arrange a few workshops for us prior attachment so that we have some hands on experience because theory is too much but practical we lack so that would help us
10. It will help us not to be shy at work

11. VCS March 29 at 1:06pm · Edited ·
12. University should hold a meeting with the company before student starts to provide the attachment expectations and if the company cannot support then the student can be assisted in finding another place also with some recommendation from that company.

13. FHS March 29 at 8:37am ·
14. The computer science attachment coordinator should source out good companies that offer the specific objectives so that we can gain more relevant experiences because some of the companies their IT sections are small and they do not allow students to enter in to server rooms , to access their databases ,to fix computers because they have the tendency that students have no prior knowledge on this ,if they face challenges with fixing computers they outsource services ,so this leads to attachees not gaining enough experiences.

15. FHS March 29 at 10:56am ·
16. The computer science department should state the objectives of attachment and pass them to different companies ,
17. If the companies that meet these objectives respond to their needs then they must send them their students CV's and they will select the attachees that meet their offer,
18. The department should have a pool of companies that meet their objectives and they must teach us practical that meet attachment objectives so that when we apply to these companies we will be the right candidates

19. FHS March 29 at 11:00am ·
20. Some of the objectives the university states cannot be met by different companies so the university must also adjust to what other companies offer basing on the technological

advances

21. FHS March 29 at 11:06am · Llike · 2

22. the university must also teach us courses that are in line with technological advances because for example most companies are not using Dreamweaver for web development they are now using Joomla ,Drupal,
23. Others are not using Microsoft access in databases they are now using sql
24. So the university must go in different companies to do field research so that they can come up with what is done in these days so that when they sit down and make a plan of courses and course outline they must implement those advances so that at the end of the day when we go out to look for attachments we will be equipped and have practical experiences ,by the end of the attachment period we will gain IT experiences and after the completion of our programmes we will have something to say in interviews that I am good at this and this and I will convince the panel that I am the right person for that post

25. PTDS March 29 at 2:56pm · Like · 1

26. FHS u can say that again
27. I remember my attachment interview at ****i was asked what Joomla was and what was its purpose.
28. I had no idea what it was, we had done hard coding using html .so honestly that should be considered what is the in thing right now and we do that

Table 5—0—22: Unit 22 ~ Question on collaboration

01. TMLMarch 18Seen by 10.VCS likes this

02. In terms of the tasks assigned to you at the organisation you were attached, were there tasks that you were assigned to that needed team effort to be completed?
03. Explain how you went about solving these and your team work experience on this.

05. FHS March 18 at 4:31pm ·

06. Some tasks we do as a team but as we all know the Shona saying which says "mbevazhinjihadzinamarishe" (having many people assigned to a task does not necessarily mean you will get the job done) ,
07. Some members were not participating because they know that others will do it but on other hand team work helped me in areas where I don't know

08. FHS March 18 at 4:32pm ·

09. Sometimes the work was done by 2 or 1 people

10. MMS March 18 at 5:35pm ·

11. Team work is the best way to get objectives achieved in time.
12. I have noticed that in a team we have to identify team member strengths and weaknesses and base on them on allocating tasks.
13. This helped us to get the job done in time rather than allocating tasks to resources that are not competent.
14. From my experience, team work in most cases work well though there are some individuals who won't deliver in time.
15. Many strategies can be employed to get such individuals work.

16. By the time I had to lead a team, I could push those I was close to and those who I can convince to work so that at update meetings its easier to say most of the team is done but we are still waiting for such individual.
17. This could automatically push the individuals to work in time.

18. TZS March 20 at 5:00pm · Like · 1

19. I will never forget a task that my supervisor and I worked on as a team.
20. The job was of converting stock codes of the whole database to a new format.
21. They were around 10 000 codes which we had to convert one by one.
22. Within a weekend that is from Friday to Sunday, working from around 8am to 10 pm.
23. Due to hard work and motivation from each other we managed to complete the job nicely.
24. From that our relationship grow significantly.

25. TMS March 22 at 1:37pm · Like · 1

26. Well, every task assigned to us, as a group of "obedient worker ants" always needed teen work, as the quoted phrase implies.
27. On the cabling side of it, every1 of us had some sort of physical and mental input in the work being done regardless of academic or field experience as required 'real time processing' and 'execution' once the job begun...
28. So regardless of the apparent or less apparent evidence of difficulty pertaining to a job, team work was indispensible in that instance, and a job which could seem difficult on the surface could be very easy and vice versa.

29. TMS March 22 at 1:38pm ·

30. *team work

31. TMS March 22 at 1:39pm ·

32. and lots of jokes and 'healthy' rivalries were experienced mind you ...

33. TMS March 22 at 4:20pm ·

34. ... on the network support side, the tasks would be mo individualistic but if the problem solving became difficult, more people would be assigned to the job... kinda like a 'meeting of minds' ... so that's where we'd experience the above mentioned situation.
35. So usually, we'd trouble shoot using the usual general methodology on separate computers and do research on the internet where necessary,
36. discuss possible routes we could take to solve the problem,
37. and eliminate those that didn't work from our list of possible 'problem solving' methods

38. FHSMarch 25 at 1:35pm ·

39. Most of the jobs w used to solve them in pairs when I was working with the hardware technician my other colleague was in the systems section ,so we solved all the tasks that are related to systems and hardware ,
40. I will not forget this error that comes with another machine saying "ntldr is missing in windows" ,at this point me and my friend we got stuck but our superior said fix this problem and format the machine so we go on Google and search for solutions and we fixed it ,ohhh thanks to Google

41. PTDSMarch 25 at 1:37pm ·

42. Team work was awesome it really helped in coming out of ideas and handling a problem easier we delegated each other a task then if one could not solve it we would ask our supervisor for a solution if we could not solve it alone

43. FHS March 25 at 1:37pm ·

44. When I was working in web development section ,i worked with my supervisor there was no other attachee to help me ,
45. so every information that was to be uploaded ,edited were directed to me but my supervisor was of help in everything ,
46. so my job was easy & I enjoyed attending problems when my supervisor was away and I will say to him when he comes I did ,this & this and he was very happy

47. PTDS March 25 at 1:40pm ·

48. I would say in most cases team work was better because you learn from your other mates as well as the supervisors if you do something alone one can tend to give up but as a team one would suggest what if we do this and it will work so it eased the burdens for us

Table 5—0—23: Unit 23 ~Response on duties assigned to a student

01. VCS March 20Seen by 9TML like this.

02. Mostly difficult tasks I had to do in union with my supervisor cause there was not much room in making mistakes on such missions.
03. I only did as an individual the duties I had been trained on and those with solutions that could be easily looked over on the internet.

Table 5—0—24: Unit 24 ~ Question on authentic environment

01. TML March 3Seen by 10

02. Basing on your own experience on industrial attachment, how would you explain the environment you are/were exposed to in terms of the tasks assigned to you by your supervisor or the experience you got from tasks you undertook?
03. In other words, were you exposed to a complex environment that needed real solutions?
04. Explain how long it took you to complete tasks assigned to you, and the steps you went through in completing those tasks.

06. TMS March 4 at 1:21pm ·

07. I was, in terms of a complex environment yes, though the stuff was repetitive

08. TMS March 4 at 1:23pm ·

09. As for the process, will need to think about it and will come back to you after thinking through soon...

10. TMSMarch 4 at 1:29pm · Like

11. I would love to hear your explanation of the process

12. PTDS March 4 at 2:33pm · Like

13. It was a bit complex and some of the tasks really needed real life solutions what I did was to consult my supervisor if I didn't know and Google of course

14. TMSMarch 10 at 11:11am ·
15. Okay... Im back

16. **TMSMarch 10 at 11:12am ·**
17. ummmmm,,

18. **TML March 10 at 11:13am ·**
19. waiting.....

20. TMSMarch 10 at 11:43am · Unlike · 1
21. First and foremost, I'll explain the process we'd undergo in the cabling department... the management would go and do a site survey, which I never got the opportunity to participate in unfortunately... or maybe it was a fortunate thing ... and they'd reach a consensus as to which materials would be needed and on some other managerial stuff which had to do with accounts and stuff, thus my lack of concern in that area at that moment.
22. Then we, as a team would go to the site with all the agreed upon materials to be used at the site, see the ICT guy who'd give us a 'tour' of the places we either needed to lay new networking infrastructure or repair.
23. Then we'd need to decide, as a team, on the best way to go about the job with respect to issues such as the fact that we'd need to choose the shortest route coz the longer the Ethernet cable, whether it be ordinary network points or the backbone, the more prone to packet loss it would be, to a maximum of 100m..., and other "elementary" networking issues ....
24. THEN WE WOULD WORK LIKE DONKIES ...
25. And sometimes the agreed upon stuff would be insufficient so at times we had to work around a lack in some area through our initiative or if it became too big for us to simply sidestep such issues, we'd take it to the higher authorities, who'd decide what to do, and some of the times the decisions would live us in a dire situation...
26. In simple terms, IT SUCKED, and since we were, or rather the cabling was considered e lowest in the food chain so they were prone to "predatory" tendencies from the higher ups...

27. TMSMarch 10 at 11:45am ·
28. and now to the network support side... phew... typing, eish ... my fingers feel like they were involved in a fist fight... u can just imagine fingers in a fist fight, hhhhhh... anyway

29. TMSMarch 10 at 11:58am ·
30. The network support department had two main problem solving situations presented to it, it was either attending to faults or building a new section of the cyber network structure into the already existing one in such a manner that they'd be manageable in a less complex manner.
31. Well, the network engineers had a list of all configuration information on note pad documents in different folders representative of clients and subfolders representative of the client's subsidiaries around the country or around a single town.
32. This would simplify the process of a new networking node in the existing network and would help in assignment of IP addresses to networking devices and equipment therefore it would involve configuring devices and deployment of them.

33. TMSMarch 10 at 12:10pm · Like · 1

34. When faults were reported, the first thing would be to check the routing in proxy, from the comfort of the office (*sigh) ... and if that proved fruitless, we'd drive to the client's premises where the problem would have been reported.
35. The first thing we'd do there would be to check all the physical connections, and if nothing was wrong with that or rectifying a problem in the physical connection would not result in data packets flowing, we'd trouble shoot on the cmd or some networking specialised app till we found the problem.
36. Technically expressed, we'd test the network from the lowest level of the 7 layer OSI networking model, going up the model till the problem was solved... thus the reason of starting with the physical connections and hardware, the physical layer... this was much more fun than "WORKING LIKE DONKEYS" with cabling... and though 1 problem could range from being solved in an hour, two weeks, I wasn't obligated to be there all the time so good for me ...

37. TML March 13 at 2:44pm · Like · 1

38. WORKING LIKE DONKEYS kkkk

Table 5—0—25: Unit 25 ~ Student selling computer equipment

01. MMS February 5 · Harare · EditedSeen by 10

02. Hi guys, I'm fl0oded with hp, dell, Sahara computers second hand but almost new, looking for market. can help. from $350 neg

04. PTDS February 5 at 2:01pm ·

05. I need one hw much can it cost

06. PTDS February 5 at 2:02pm ·

07. I need it urgent

08. MMS February 5 at 2:26pm ·

09. from $350

10. PTDS February 5 at 2:46pm ·

11. inbox

12. MMS February 5 at 2:48pm ·

13. cash and carry please credits to be introduced soon

14. MMS February 5 at 2:48pm ·

15. inbox

16. MMS February 5 at 3:13pm ·

17. I am to provide more photos, this is one of a type
18.

19. TML February 5 at 3:25pm ·
20. Hi Mike, try n contact ICT Buse, I know they wanted some(value $20k) in case they still haven't sourced a supplier

21. MMS February 5 at 3:27pm ·
22. Thanks TML let me try them, it means they need a lot of them

23. PMS February 5 at 3:46pm ·
24. What are the specifications. I need one. send more pictures

25. FHS February 5 at 10:30pm ·
26. Your picture is not clear,send more pictures so that I can market them

Table 5—0—26: Unit 26 ~ Question on practical solutions to problems

01. TML August 30, 2013Seen by 12
02. Reflecting on your practical during industrial attachment, can you discuss how you went about solving the complex problems you were assigned to,
03. How you have improved in delivering quality service the next time you were assigned a similar task.
04. You can use examples of the actual tasks you were assigned.
06. Like

07. PTDS August 30, 2013 at 11:59am · Like · 1
08. What I usually did my pen and notebook were my best friends,
09. all I learnt and what I did with my supervisor I would write down in my book in detail step by step.
10. And the next time I would go to it alone
11. I would simply refer to my notes. Examples of cases I did

12. PTDS August 30, 2013 at 12:03pm · Like · 1
13. On one incident I was alone at the power station, IT department and 8 Chinese delegates who were working on a project named ***** project of the expansion of the ****** power station.
14. I was tasked by the maintenance manager to set up a workstation for them in the penthouse

and it required termination of many cables, setting up of switches, creating ip addresses for them on the server as there is no DHCP here.

15. PTDS August 30, 2013 at 12:04pm · Like · 1

16. The task was complex, included creating email addresses as well and I did this all alone using my notes and well the hugest search engine Google.
17. Can we ever live without Google?
18. I doubt kkkkk.

19. MMS August 30, 2013 at 7:11pm ·

20. I could always check the time I have to solve the problem, I could also check if the problem is of priority, meaning to say something won't work out if the problem is not solved or it's a nice to have.
21. If there was time I could try, research on the new problems that emerged in the problem until solved or I gave up to get assistance.
22. If the problem had a possibility of hindering progress, I got the readily available help from them so that I could retrieve progress in time.
23. The first thought that could come into my mind in such a situation is who among the team is best in the area were the problem arise if I am not competent.
24. To give examples
25. 1) A case when the accounting module is producing wrong balances on reports.
26. This is a sure stopper if the system is in production so it needs an agent solution.
27. 2) when someone needs seekers to be installed on her desktop to listen to some music

Table 5—0—27: Unit 27 ~ Question on how students learnt concepts

01. TML August 28, 2013Seen by 11

02. How did you learn what you learnt on industrial attachment?

04. PTDS August 28, 2013 at 10:17am · Like

05. My personal experience, help mostly came from the supervisors during the first month,
06. going with me to attend common problems and show me how to rectify them,
07. after some time when they were confident with if a user called with a query I would go alone and attempt to sole alone

08. PTDS August 28, 2013 at 10:18am · Like

09. and Google came to my rescue so many times i solved many problems using google

10. PTDS August 28, 2013 at 10:19am · Like

11. I also realised research was so important and logic works you just have to reason as an IT person.

12. PTDS August 28, 2013 at 10:35am ·

13. at one point I called VCS asking where the network card was on a computer because I knew VCS is well versed with hardware and I solved that problem over the phone with him.

14. You will realise that hardware at school we just knew theory when it came to hands on alas I personally had no experienced.
15. Another thing just being adventurous pays I showed enthusiasm on networking and I ended up being exposed to the server room which was out of bounds to students.
16. I was shown how to configure a router resetting email passwords on the server creating passwords etc
17. So I gained much by showing my willingness to learn

18. VCS August 28, 2013 at 2:01pm ·

19. Practical exposure on watching demonstrations of how some problems had to be resolved through my supervisors helped at lot.
20. When I had challenges usually I visited mostly you tube because I understand better from watching ,
21. at times text tutorials and
22. if no positive outcome I would escalate the issue to my supervisor for assistance.

23. FHS August 28, 2013 at 6:12pm ·

24. I learned thru asking my supervisor in the early months but as timewent by, I used Google,
25. If the problem seems to be hard, I would call an expert in the area,
26. For example for a network problem, I would call the network engineer and he would tell me what to do overthe phone

27. FHS August 28, 2013 at 8:48pm ·

28. I also learned thru asking colleagues online and face-to-face in meetings that we used to hold
29. and asking former attachees who were working @ Buse

30. TMSAugust 29, 2013 at 2:03pm ·

31. through osmosis, by learning whilst applying in a real life situation...
32. through use of simulation software...
33. GOOGLE that is the internet,
34. LOL... and also through oral exchange

35. TML August 29, 2013 at 4:14pm ·

36. @ TMS which simulation software did u use?

37. MMS August 30, 2013 at 5:49pm · Like

38. "Experience is the best teacher", they say.
39. To learn what I now know through attachment I could use any form of strategy to get the knowledge,
40. I could ask, try, research depending on the complexity of the problem.
41. Where there was time I could try to solve from my own knowledge with the help of mother Google.
42. If complex I could ask and since there was time they could try to solve the problem to perfection.
43. If there was no time I could find the nearest person who could help so that the problem could be rectified easily especially when it is a shore stopper.

Table 5—0—28: Unit 28 ~ Student questions curricula

44. MMS July 31, 2013 · HarareSeen by 12
45. By the way I am also worried why it's rare to here of inventions or unique implementations from our local universities.
46. Does it mean we don't have Ideas, does it mean Indians, Germans and Americans are the think tanks,
47. Is it the students are not motivated, is it that .
48. I am sure something needs a change but I don't know what exactly. help me find out

50. TML July 31, 2013 at 1:32pm · Like
51. In my area of education I have come to know that even in situations where we are just supposed to use a technology that was invented in the developed context, educators are in fear for example of trying to use a technology in front of students who are already experts in using technology

52. MMSJuly 31, 2013 at 2:05pm ·
53. At first I laughed at this but it's not a laughing matter what can the students do now

54. PCS August 1, 2013 at 10:06am · Like · 1
55. MMS what you said is true,
56. cozsometimesyou might be interested in inventing new technologies and so forth or even enhancing existing ones but because you have never heard of such sometimes you lose heart ..... and it's true something ought to be done.....

Table 5—0—29: Unit 29 ~ Student questions curricula

01. MMS asked a question. July 31, 2013Seen by 12
02. I want to be sure if I am going the way of a Software Engineer or a Computer Scientist.
03. What's the relationship between the two?
04. What are your views basing on the Degree programme that we are currently taking?
05. Should be there any changes for specialization to be easy for students?
06. Check what I posted bellow and give your views.

11. MMS July 31, 2013 at 12:33pm ·
12. Should we have degree programmes like Computer Network Engineering/Software Engineering on top of what we already have

13. TML July 31, 2013 at 12:35pm ·
14. I have seen some like Information technology degree

15. TML July 31, 2013 at 12:40pm · Edited ·
16. Well, I also think if for example you want to be a software engineer, there are certain basics you ought to know about the hardware, network and admin for you to be able to make a software that utilises the hardware so which means maybe the Computer science degree can be the base then you will advance to another degree in your area of specialty.
17. This is me thinking .

18. MMS July 31, 2013 at 12:59pm ·

19. So if they are basics shouldn't we take them back a bit to a level like A' Level if we expect university students to be able to implement useful softwares and hardware components then specialization starts at first degree.
20. Maybe I am becoming optimistic. I just don't want to die in university from a degree I think someone will be thinking of a masters then phd/ something else above. I
21. am taking it from western way of grooming spots participants, a child is lead the way he/she is best in and follows the track not for to be forced to get the test of everything.
22. I am sure it will lead us to be jacks of all treads but not mastering any

23. TMLJuly 31, 2013 at 1:08pm · Like · 1

24. I hear you MMS, we also need to note that Computer Science is still "ne" in our context so the levels where it is started may be high for now.
25. The education system however must take note of new changes and respond in time. I
26. would like to believe that "Computer Science" in terms of learning and applying new technologies must start at grassroots level.
27. Even when u look at some Western programmes, somebody is doing a programme like Law, BusinessAdmin, Anthropology, Medical doc all with a flavor of technology.

Table 5—0—30: Unit 30 ~ Student explains what they understood

01. MMS July 31, 2013 · HarareSeen by 12 TML like this.

02. The information below is what I got right now.
03. I need to know more and I'm sure one can help me by answering the questions above.
04. Source: Software Engineering Society (SES)
    Difference between Computer Science (CS) & Software Engineering (SE):
    CS:
    Computer Science covers the core concepts and technologies involved with how to make a computer do something. Learning to programme a computer by writing software is essential, and computer Programming is used in most computer science courses. You will learn details about how computers and networks work, but with an emphasis on how software and Programming languages work. You will learn how to make them do very sophisticated things (e.g. graphics, robotics, databases, operating systems). You will also learn about the theory behind how and why computers and software work. In your senior project, you will tackle a problem at the frontier of computer science. You may be building a new system, discovering better ways to design software, or developing new algorithms for projects in entirely different fields; it's up to you. Past student projects include: video games, computer modeling and animation tools, and a Linux driver for the Wii remote.
05. SE:
    Software Engineering focuses on how to design and build software in teams. You will take many of the same courses as you would in computer science, but you will take additional courses that teach you about topics like requirements engineering, software architecture, software testing, and software deployment. You will learn about working with people (communication, management, working with non-technical customers), processes for developing software, and how to measure and analyze the software product and the software process. The software engineering major requires that you take a three course (nine-month long) sequence called the software engineering capstone. The capstone courses are centered around a large project for an outside customer. In recent years we have built web applications for Intuit (makers of Quicken, QuickBooks, and TurboTax) and Amgen (a bio-engineering/pharmaceutical company). Students work in teams of four or five

people to elicit and develop requirements for the system, design an architecture, build prototypes, implement the system, then deploy and maintain the system.

07. TML July 31, 2013 at 12:45pm ·

08. @ MMS, and your final project in computer science which is equivalent to 2 courses should be an implementation of some software or so...

Table 5—0—31: Unit 31 ~ Student talking about personal life

01. VCS March 13, 2013Seen by 14

02. Hie family,hopeyou areall well.
    I faced tonsils on Saturday but now they are normal but the problem is my heart. The doctor said there was too much puss in them which broke into my circulatory system. Now my heart faces sharp pains at times.
    I tried going to work but it's too painful when it starts.
03. Today I went and came back early Im to rest for a while.
04. Please consider me in your prayers.
05. Miss you all

07. MMS March 13, 2013 at 5:07pm ·

08. Ok bro, all shall be well.
09. So where are you nw. I want my prayer to point exactly where you are

10. VCS March 13, 2013 at 5:08pm ·

11. Im @ home MMS, do not miss!

12. PTDS March 13, 2013 at 5:09pm ·

13. May u be healed in Jesus name.
14. Sickness has no power over you that pus will disappear from the circulatory system .
15. By faith you are healed

16. MMS March 13, 2013 at 5:10pm ·

17. Receive bro....healing in the name of the Almighty Lord Jesus Christ

18. VCSMarch 13, 2013 at 5:10pm ·

19. Thanks sis a lot

20. VCSMarch 13, 2013 at 5:11pm ·

21. I do mike thanks

22. MMS March 13, 2013 at 5:12pm ·

23. Is it that you fear the sixty pages for report

24. VCS March 13, 2013 at 5:18pm ·

25. Nooo, it could be worse if I start thinking about that
26. PCS March 14, 2013 at 7:35am · Like · 1
27. Get well soon chats for all is well for u in Jesus name.....

28. FHS March 14, 2013 at 8:42am · Like · 1
29. ohhhhhsorry dear God will heal u quickly

30. VCS March 14, 2013 at 11:28am ·
31. PCS and FHS

32. TMS March 14, 2013 at 5:22pm ·
33. heyVCS, sorry I had no access to the platform -FHS is blocking us .
34. How are you feeling now?

35. VCSMarch 14, 2013 at 5:45pm ·
36. Hie madam .you will have to beg her , yah I can feel a change
37. Today it only append once.
38. Yesterday by this time it had happened thrice. thank u

39. MMS March 14, 2013 at 6:39pm ·
40. Hope u are off bed bro by now, and have recovered

41. TMS March 14, 2013 at 6:42pm ·
42. keepgetting better bro...

43. PTDS March 14, 2013 at 6:46pm ·
44. HaaVCSis now okay, he is smiling, can't u see guys?

45. MMS March 14, 2013 at 6:47pm ·
46. KkkkkkkkkkkkkkPTDSyou!

47. VCSMarch 14, 2013 at 7:12pm ·
48. Yes Im getting better family by mondayI will be strong.
49. Thanksyou are a blessing

50. PTDS March 14, 2013 at 7:21pm · Like · 1
51. Thank God dear because our Jesus

52. VCS March 15, 2013 at 6:49am ·
53. ahhh you
54. Im a tough one, better than MMS

Appendix B.

Extracts of Facebook Screen Shots - Unedited

Figure 2: Student sharing information

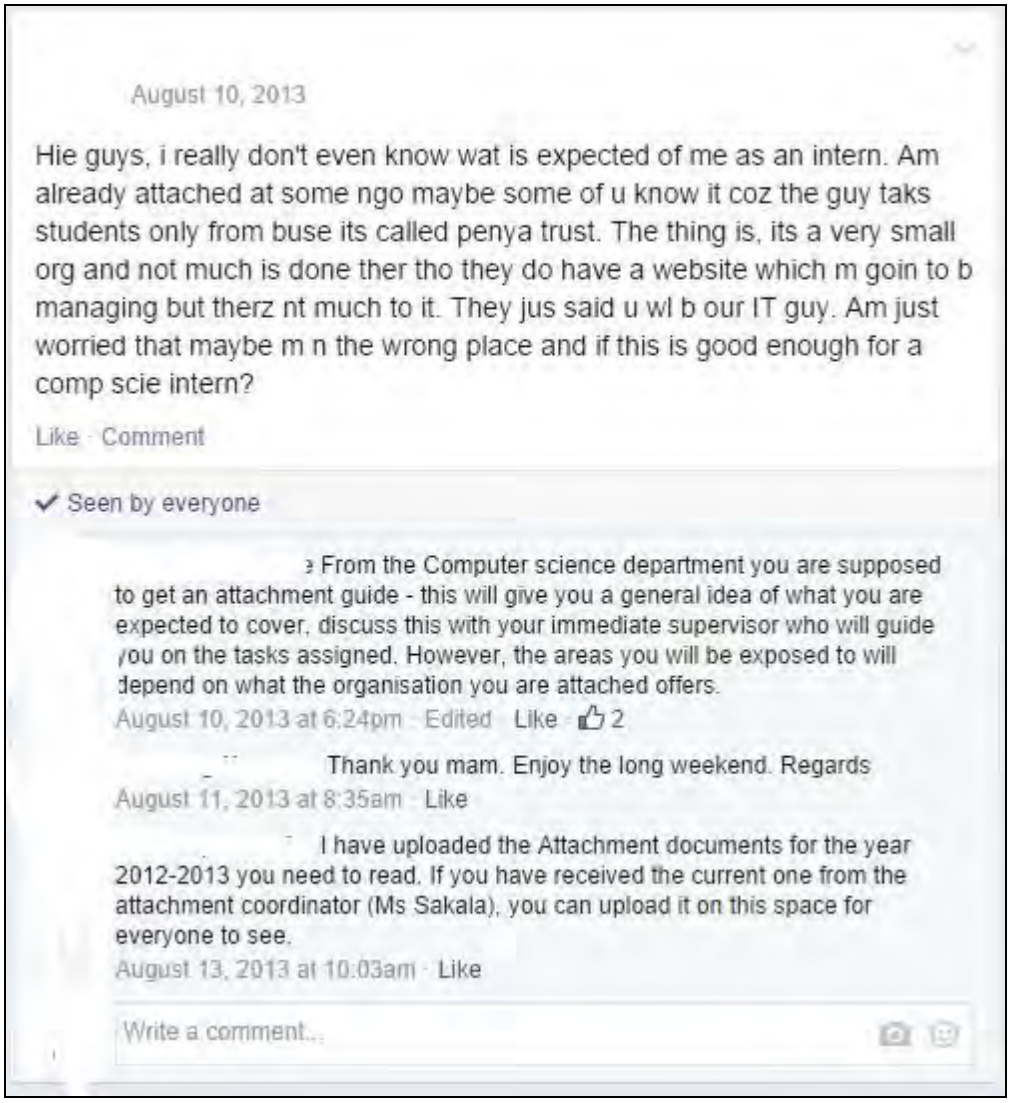


Figure 3Student asks for information

Figure 4:Student request for assistance

Figure 5: Student post feedback

Figure 6: Upload of departmental Industrial Attachment documents

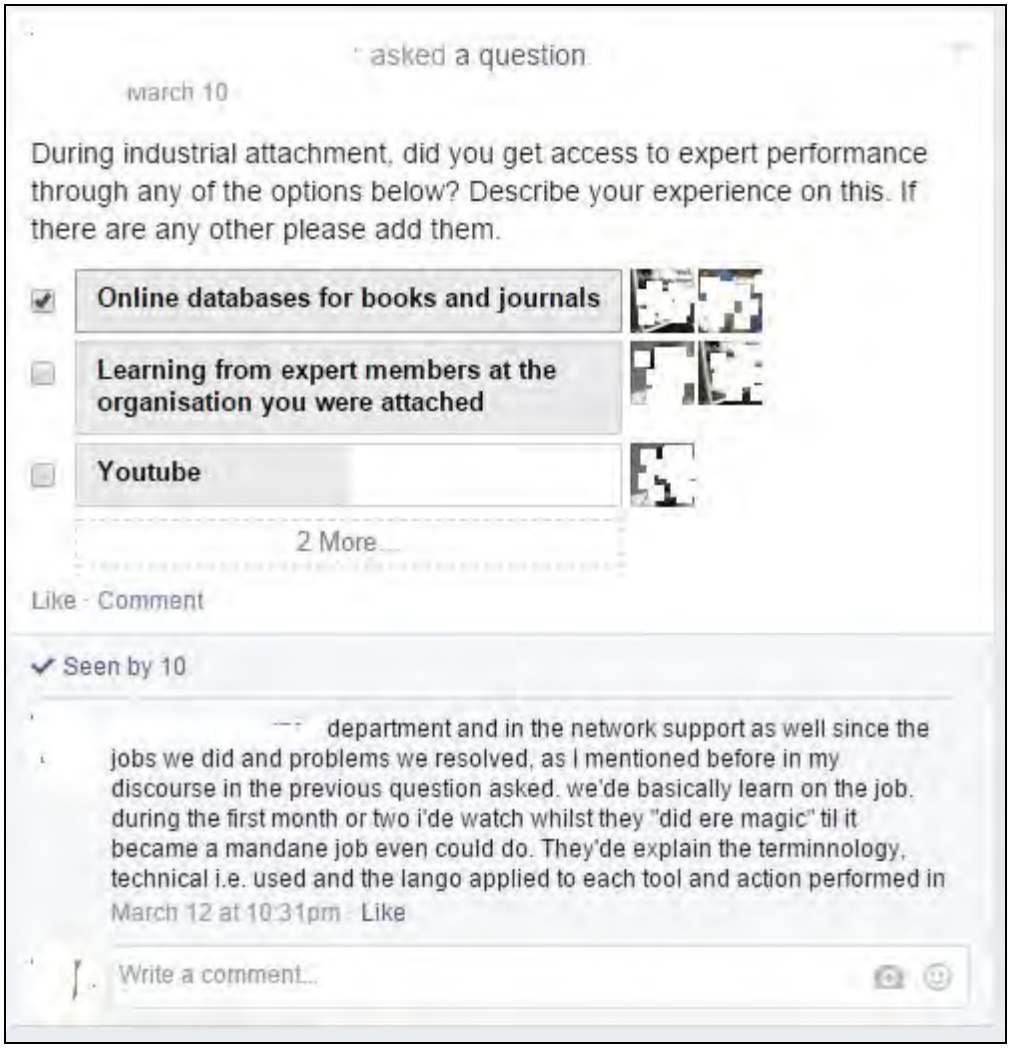


Figure 7: Sample question posted

Figure 8: Question with guided options for response

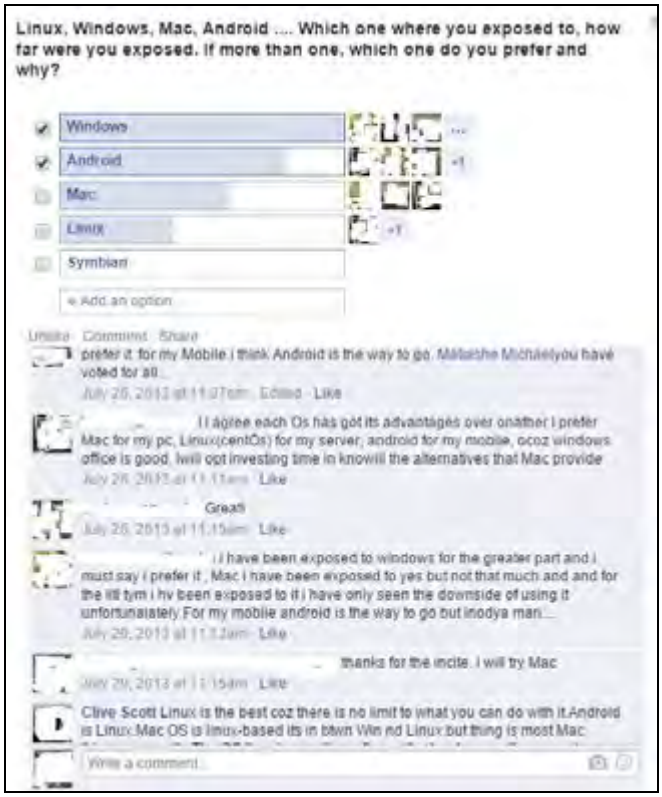


Figure 9: Question with guided options for response + dialogue

Figure 10: Events created on Developers Group

Figure 11: Chat with student to check why they were not participating

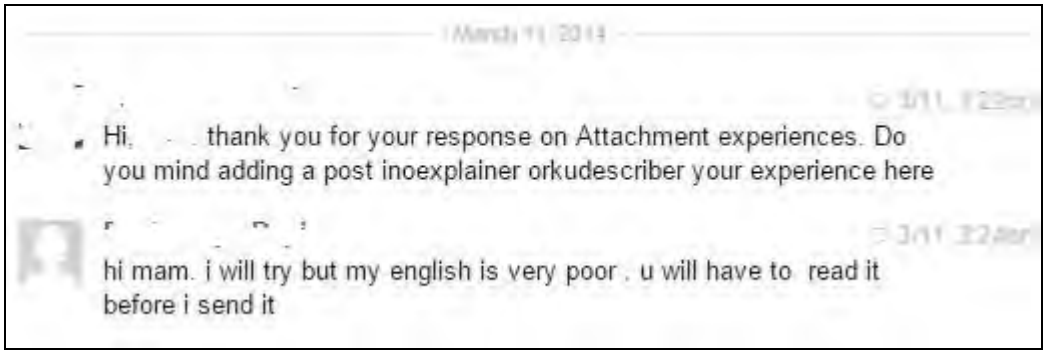


Figure 12: Chat with students to motivate for participation

Appendix C.

1. Industrial Attachment Guidelines from Bindura University

BINDURA UNIVERSITY OF SCIENCE EDUCATION (BUSE)

DEPARTMENT OF COMPUTER SCIENCE

INDUSTRIAL ATTACHMENT GUIDELINES/WORK PLAN

1) OBJECTIVES

The objectives for industrial attachment of Bindura University of Science Education students in Computer Science are; inter-alia:

1.1 To offer students an opportunity to test their theoretical tools and constructs learnt during their first two years of the degree programme with the realities of running business organizations in Zimbabwe and worldwide.
1.2 To expose students to behaviors of organizations that isboth internal and external environments.
1.3 To offer students an opportunity to develop hands on experience in the world of business and its intricacies.
1.4 To solicit the help and experience of business managers, especially supervisors and training officers, in training and developing future managers.
1.5 To create partnerships between the Bindura University of Science Education and both the private and public sector enterprises.
1.6 To offer students an opportunity to develop entrepreneurial skills and knowledge.
1.7 To seek industry's evaluation of our degree programmes in terms of relevance to industry and commerce.

2 EXPECTATIONS ON THE INDUSTRIAL ATTACHMENT

Notwithstanding the confidentiality of some of the decisions and activities within different business organizations. BUSE expects the following benefits to accrue as a result of industrial attachment.

2.1 Students would be in a position to develop useful experience on the structures, operations and integration of different functional areas such as finance, marketing, production, human resources, research and development etc.
2.2 As a result of engaging in team work, students are expected to enhance their interpersonal relationships.
2.3 From the attachment, students are expected to learn the methods of conducting research, analysis, presentation and report writing.
2.4 Students should add value to companies to which they would be attached. They should learn to be productive to their host company. Students are not on fault-finding mission but they must respect confidential information that the company exposes to them.
2.5 It would also be helpful where confidentiality requirements permit to expose students to be part of senior management committees and corporate planning staff so as to expose them to the dynamics of environment sensing and interpretation, objectives, strategy policy development, implementation and evaluation.
2.6 To enable students to decide on career decisions and advancement.

3 SUGGESTED FORMAT OF ASSIGNMENT AND PERFOMANCE EVALUATION

The suggested format and performance evaluation of students are as follows:

3.1 There should be a job rotation scheme to enable students to be exposed to different functional areas of host organizations.

3.2 There should preferably be equal allocation of time to each functional area.

3.3 The evaluation of students should basically take the following form:

- The supervisor's evaluation form should be used by the industrial supervisor to evaluate the performance of the students.
- Two(2) forms are to be completed by the industrial supervisor.
- The academic supervisor's form will be used to evaluate the performance of the student by the university supervisor.
- The evaluation report from the student should be made available to host company management as well as to the student's academic supervisor at the Bindura University of Science Education.
- At the end of the attachment period each student under the guidance and supervision of an academic supervisor would be expected to write a comprehensive report on experience gained during the attachment period. Such a report should demonstrate some strong appreciation of the operations of the company and should be of some use/benefit to the host company. This report is expected to add practical value to the host company, student and the university.

4) OBLIGATIONS

4.1 During the period of industrial attachment students are under the authority and discipline of the host company.

4.2 The host company is expected to help students to meet costs incidental to their assignments and duties during the period of attachment.

4.3 Where possible the company can also assist students in finding temporary accommodation and this will be highly appreciated by the Bindura University of Science Education. The university is very mindful of problems in finding accommodation by both students and host companies.

5 TRAINING PROGRAMME

5.1 It is not the wish of the department to impose any programme on the company. However the company can design a structured programme that should cover among other things the following:

- Induction/orientation course
- A structured outline covering main tasks, departments and performance targets

5.2 The company is requested to provide the student every opportunity to function like a full-time and permit him/her to actively participate in all aspects of the business.

2. Industrial Attachment Report Guidelines from Bindura University

BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF COMPUTER SCIENCE

ATTACHMENT REPORT GUIDELINES

1. **OPERATIONS INFORMATION**
   This section should give detail of the organization in which you are attached.

   a) **Background sketch of organization**
      i. Location
      ii. Nature of Enterprise
   b) **Organization Performance**
      i. Basic organization outline
      ii. Key Personnel
   c) **Your Place in the Organization**
      i. Scope of your job (specific tasks, duties, supervisory activities etc)
      ii. Routine (typical daily activities for the department you are working in)

2. **PROGRESS ON ATTACHMENT**
   This section should be centered on analyzing various practices used in IT operations. Typical practices include data back-up, virus safeguards, network and Internet traffic monitoring, systems design, coding etc

   a) **Technical Aspects**
      i. Could any procedure be simplified to save time and/or money? e.g. going out to a site to configure a workstation/server.
      ii. Are back-ups and other activities carefully planned or haphazard?
      iii. Are users informed and thoroughly trained on new projects and software?
      iv. Are you contributing in exploring old ideas and devising new ways doing things?

   b) **Business Management**
      i. Company Policies (Human Resource Policy, IT Procedures etc)
      ii. Corporate culture (General communication)

3. **AVAILABILITY OF ATTACHMENT OBJECTIVES**

   Are the current objectives clearly stated and a way to meet them clearly outlined?

4. AVAILABILITY OF WORKPLAN

a) Availability of work plan
b) Challenges in implementing work plan
c) Are the activities for the next quarter clearly stated

5. REPORT FORMAT

The value we place in on your writing skills reflects our belief that you should be able to communicate effectively in writing. Our goal is to reward students who demonstrate enough pride, self discipline and patience to produce well written attachment reports.

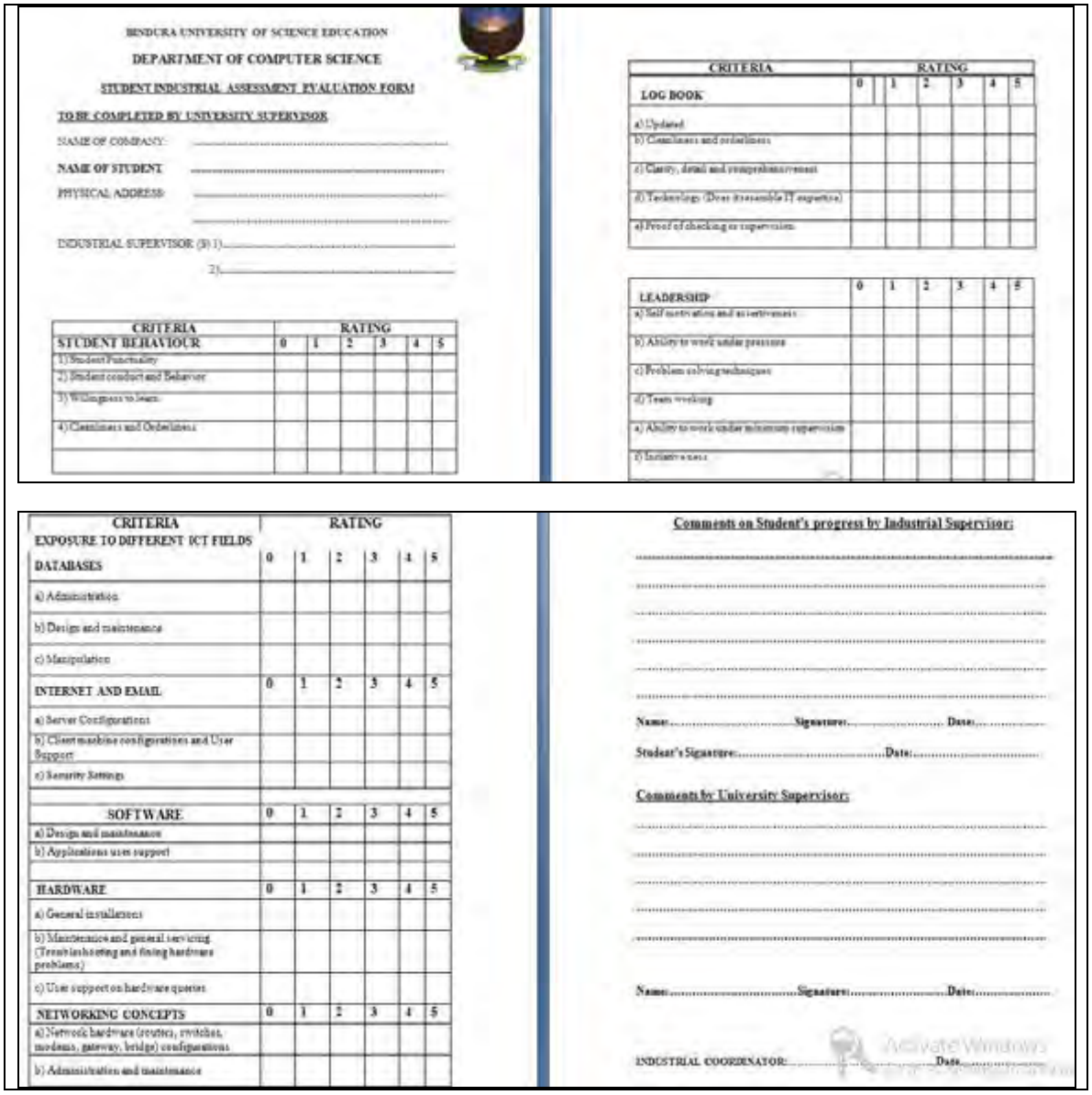
a) **Typing**
   i. There should be justification alignment in your word document.
   ii. No condensed words or slang.
   iii. No digits except for page number and other information.
   iv. Only proper punctuation must be used.
   v. All lists should be properly bulleted. All bulleting should be done in the same fashion that is All 1, 2, 3 should begin at the same point and so should all a), b), c) and i., ii.,etc
   vi. Font size 12 Times New Roman

b) **Sentence and Grammar structure**
c) **Spellings**
d) **Conciseness and informativeness of report**

This should include:

- Is the report factual and to the point?
- Does the report provide clear information of what the student has been doing?
- Is the report well presented and arranged?

3. Assessment Rubric - Academic Supervisor



BINDURA UNIVERSITY OF SCIENCE EDUCATION

DEPARTMENT OF COMPUTER SCIENCE

STUDENT INDUSTRIAL ASSESSMENT EVALUATION FORM

TO BE COMPLETED BY UNIVERSITY SUPERVISOR

NAME OF COMPANY: .....

NAME OF STUDENT .....

PHYSICAL ADDRESS: .....

.....

INDUSTRIAL SUPERVISOR (S) 1) .....

2) .....

CRITERIA	RATING					
STUDENT BEHAVIOUR	0	1	2	3	4	5
1) Student Punctuality						
2) Student conduct and Behavior						
3) Willingness to learn						
4) Cleanliness and Orderliness						

CRITERIA	RATING					
LOG BOOK	0	1	2	3	4	5
a) Updated						
b) Cleanliness and orderliness						
c) Clarity, detail and comprehensiveness						
d) Technology (Does it resemble IT expertise)						
e) Proof of checking or supervision						

LEADERSHIP	0	1	2	3	4	5
a) Self motivation and assertiveness						
b) Ability to work under pressure						
c) Problem solving techniques						
d) Team working						
e) Ability to work under minimum supervision						
f) Initiativeness						

CRITERIA	RATING					
EXPOSURE TO DIFFERENT ICT FIELDS						
DATABASES	0	1	2	3	4	5
a) Administration						
b) Design and maintenance						
c) Manipulation						
INTERNET AND EMAIL	0	1	2	3	4	5
a) Server Configurations						
b) Client machine configurations and User Support						
c) Security Settings						
SOFTWARE	0	1	2	3	4	5
a) Design and maintenance						
b) Applications user support						
HARDWARE	0	1	2	3	4	5
a) General installations						
b) Maintenance and general servicing (Troubleshooting and fixing hardware problems)						
c) User support on hardware queries						
NETWORKING CONCEPTS	0	1	2	3	4	5
a) Network hardware (routers, switches, modems, gateway, bridge) configurations						
b) Administration and maintenance						

Comments on Student's progress by Industrial Supervisor:

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Name:.....Signature:.....Date:.....

Student's Signature:.....Date:.....

Comments by University Supervisor:

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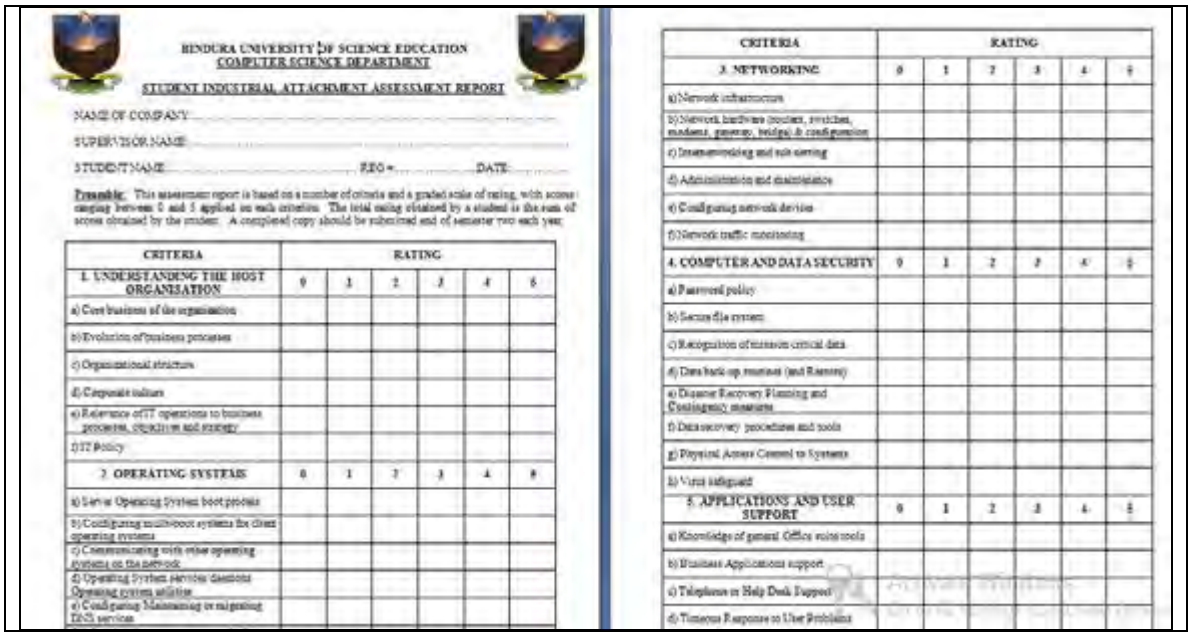
Name:.....Signature:.....Date:.....

INDUSTRIAL COORDINATOR:.....Date.....

4. Assessment Rubric - Host Organisation Supervisor



BINDURA UNIVERSITY OF SCIENCE EDUCATION
COMPUTER SCIENCE DEPARTMENT

STUDENT INDUSTRIAL ATTACHMENT ASSESSMENT REPORT

NAME OF COMPANY .....

SUPERVISOR NAME .....

STUDENT NAME ..... REG # ..... DATE .....

Preamble: This assessment report is based on a number of criteria and a graded scale of rating, with scores ranging between 0 and 5 applied on each criterion. The total rating obtained by a student is the sum of scores obtained by the student. A completed copy should be submitted end of semester two each year.

CRITERIA	RATING					
1. UNDERSTANDING THE HOST ORGANISATION	0	1	2	3	4	5
a) Core business of the organisation						
b) Evolution of business processes						
c) Organisational structure						
d) Corporate culture						
e) Relevance of IT operations to business processes, objectives and strategy						
f) IT Policy						
2. OPERATING SYSTEMS	0	1	2	3	4	5
a) Server Operating System boot process						
b) Configuring multiboot systems for client operating systems						
c) Communicating with other operating systems on the network						
d) Operating System service daemons Operating system utilities						
e) Configuring Maintaining or migrating DNS services						

CRITERIA	RATING					
3. NETWORKING	0	1	2	3	4	5
a) Network infrastructure						
b) Network hardware (routers, switches, modems, gateway, bridge) & configuration						
c) Internetworking and sub netting						
d) Administration and maintenance						
e) Configuring network devices						
f) Network traffic monitoring						
4. COMPUTER AND DATA SECURITY	0	1	2	3	4	5
a) Password policy						
b) Secure file system						
c) Recognition of mission critical data						
d) Data back up routines (and Recovery)						
e) Disaster Recovery Planning and Contingency measures						
f) Data recovery procedures and tools						
g) Physical Access Control to Systems						
h) Virus safeguard						
5. APPLICATIONS AND USER SUPPORT	0	1	2	3	4	5
a) Knowledge of general Office suite tools						
b) Business Applications support						
c) Telephone or Help Desk Support						
d) Timeous Response to User Problems						

5. Informed Consent letter signed by participants

Title: Using Social Media to enhance knowledge sharing through Authentic Mobile-Mediated Interaction: A Case Study of Bindura University Computer Science undergraduate students on Industrial Attachment Break

Supervisor and Contact Information: Professor Dick Ng'ambi, Email: Dick.Ngambi@uct.ac.za

Student Researcher's Details: Tarirayi Mukabeta (Student Number: MKBTAR001), Faculty of Humanities, School of Education. University of Cape Town. Mobile: +263772748158, Email: hietari@gmail.com.

Purpose of study:
I am a student at the School of Education, Faculty of Humanities at University of Cape. I will be conducting a research project as part of my MPhil thesis. I am working closely with my supervisor, Professor Dick Ng'ambi. I would like to know if you would be willing to take part in a research study on Using Social Media to enhance knowledge sharing through Authentic Mobile-Mediated Interaction for Bindura University Computer Science students on Industrial Attachment break.

Procedures:
You will be asked to participate in a secret Facebook group, sharing experiences with other members of the group. I am also interested in your opinions regarding your attachment experience and suggested to the computer science department. Questions will be posted on the Facebook group and you are encouraged to participate by sharing your thoughts.

Confidentiality:
All the information you provide will be strictly confidential, and your name will not appear in the final write-up of the thesis. Instead, your input to the Facebook group will contain an identification number that will be used in the write-up.

Note About Voluntary Nature of Participation and Statement About Compensation:
Your participation is voluntary. You may refuse to participate or may discontinue your participation at any time during the online survey. While we cannot compensate you for your time, your participation will be invaluable to our project as we seek an understanding students' experiences during the industrial attachment break in relation to Herrington's nine Authentic Learning elements.

Information About This Study:
You will have the opportunity to ask, and to have answered, all your questions about this research by e-mailing or calling on the contact information listed at the top of this letter. All inquiries are confidential.

Participant's Agreement Statement:
If you agree to participate in this study, I would appreciate your signing your name and date to this form and emailing it back to hietari@gmail.com or submitting to my office 3A65 Astra Campus Bindura University.

****

I have read the information provided above. I voluntarily agree to participate in this study.

_____ _____
Name Date

Thank you.

Sincerely,

_____
Tarirayi Mukabeta